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NEWS IN BRIEF

Software Exemption Bill Due for Changes

SACRAMENTO — A bill that would have given users and vendors a two-year respite from taxes on bundled and unbundled software has been pulled back from Gov. Ronald Reagan's office by its sponsor for changes that could result in making standard programs tax-free.

The bill has been put back into an Assembly-Senate conference committee, and if an agreement is reached, could be acted on again this week.

The deadline for action this term of the legislature is Friday, June 10.

The bill's sponsor, Assemblyman Joe A. Gonzales (D-La Marada), said the bill was pulled back because it would have resulted in a \$4 million revenue loss for Los Angeles County.

Business software is currently being assessed and taxed on state.

Neighboring Orange County is also assessing bundled software. The bill would have permitted the evaluation of bundled or unbundled software for the value of the media it was stored on.

Schneider Pleads Guilty To Theft in Phone Case

Special to Computerworld

LOS ANGELES — Jerry Neal Schneider, 21, arrested for allegedly stealing nearly \$1 million worth of equipment from Pacific Telephone Co., the man tracking the firm's computerized remote access inventory system [CW, Feb. 16] has pleaded guilty to grand theft.

Schneider, who had been scheduled to go to trial this week, entered his plea last week before Superior Court Judge George M. Dell.

The judge set July 5 for sentencing on a single count of grand theft.

The remaining counts, including theft, burglarizing and receiving stolen property, were dropped. No bail was set aside for disposition at the July hearing.

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Afips' Hour of Decision

Joint Conferences at 'Crossroads'

By Edward J. Bride
Of the CW Staff

ATLANTIC CITY, N.J. — The close of the Spring Joint Computer Conference here last Thursday signified the end of an era.

No longer will the "convention center" of the eastern and western U.S. be used for the spring and fall conferences. Atlantic City and Las Vegas served their purpose when the JCC committees were worrying about 1,000-booth limitations, but the recession has cut the show down to 500.

Exhibiting companies have steadily decreased from a high of more than 300 to 144, and the large mainframe makers have all stopped exhibiting, in favor of the specialized "vertical" shows sponsored by the industry.

In reaction to this apparent trend,

future ICCs, beginning next fall, will be held in greater population centers, according to their sponsor, the American Federation of Information Processing Societies (Afips).

Thursday afternoon, the overall attendance total was 13,542, including 1,993 exhibitor personnel. The new one-day registration for the technical program attracted 439 people; a one-day exhibitor only fee drew 2,509, as opposed to the 429 people who registered for three days of exhibits.

The alternatives include two- or five-day conferences. Afips thus is at the crossroads of important decisions regarding the future of the JCCs.

The equipment manufacturers were visibly affected by the continuing computer



Keynote audience fills the hall.

recession, as evidenced by the scarceness of new products as well as the number of companies.

There were only about five new end-user products introduced, and the equipment in the exhibit hall consisted mostly of computers and CRT displays, thin peripherals and OEM equipment.

After the deep concern over social issues in the past three years, the technical program got "back to basics" with a highly structured conference, featuring only three regular panel discussions, plus two open meetings Wednesday evening that did not attract crowds.

Only seven people attended the single meeting dealing with social issues, "Forum on the Environment," which was sponsored by a subcommittee of the Association for Computing Machinery.

The computer's "Coming of Age" is the theme for next fall's conference, but the maturity of the industry and of users was much discussed. Keith Uncapher, outgoing president, said:

In a special presidential address Wednesday morning, Uncapher reminded his audience that "with maturity has come the requirement for discipline" such as "documenting programs so that when programmers move to other jobs, we won't have to reinvent the wheel to get them up to speed."

Discipline also includes "manpower planning," Uncapher continued, "to prevent the feast and famine aspect of overemployment in some areas and underemployment in others."

Uncapher also expressed pleasure with the paid attendance figures and the quality of the papers presented. Meeting here was standing room only in many sessions.

During the conference luncheon, Peter Denning of Princeton University was presented the "Best Paper" award for his dissertation on "Operating Systems Principles and Undergraduate Computer Science Curricula."

Denning presented two other papers during SJCC, including one which had already won an ACM prize in separate "competition."

Luncheon speaker Dr. Andre P. Ershov discussed human factors and aesthetics of programming, commenting that this discipline "requires accuracy going beyond that needed in other types of engineering."

IBM Plans \$40M Study To Develop 'Secure' DP

By CW Staff Writer

ATLANTIC CITY, N.J. — IBM is embarking on a \$40 million, five-year project to develop data security options "as near as we can come to the limit of the art," and to make these options available to large users.

T. Vincent Learson, IBM chairman, said Tuesday that "highly qualified user installations" and a fourth at IBM would be used to "build a sound body of knowledge and develop some hands-on experience" with the new security capabilities.

In the keynote address at last week's

Spring Joint Computer Conference here, Learson said computer users' concern for data security is "still on the back burner." Manufacturers have not developed safety features because there hasn't been "little market demand," he noted.

Other hindrance to building up options for safety, he said, was that "priorities have to be given to 'throughput and other requirements that taxed the limited memory capacity'" of the new generation of computers.

IBM is trying to "anticipate" the demands of security before they become "immediate." The stated goal of the five-year research program, he continued, is "to give the customer the means to control access to sensitive data in his system and shut the unauthorized person out." The developments will be made available, initially, to "wherever we can find demand."

The data security project is closely tied to Learson's concern about potential invasion of privacy represented by increased usage of computers to collect and store information, he said.

Taking note of some bills pending in Washington, Learson said that "the trouble with legislation is that you never know where it's going to end."

While the legislation would affect consumer items such as billing, it could also deal with data banks, he indicated.

"Problems can be better solved within our own house," he stated, "with sensible

(Continued on Page 2)



(CW Photos by V.J. Farmer)

T. Vincent Learson

Goal of 5 Facilities

California to Act on 5-Year DP Center Consolidation

By Marvin Smallbeiser
CIV correspondents

SACRAMENTO, Calif.—The Assembly Ways and Means Committee is expected to act this week on a bill to implement a state long-range master plan that would consolidate 25 computer centers into five and cost an estimated \$185 million over the next five years.

The state plan was presented in a revised

version last week at a hearing of the Ways and Means Committee which heard testimony from Burroughs Corp., Honeywell Information Systems and Univac.

The plan is estimated to cost \$4.5 million in "recoverable" seed money during its first 24 months and would lead to the eventual installation of all IBM equipment.

The three testifying manufacturers ex-

pressed the desire that contracts for installation be open to competitive bidding. Neither Control Data Corp., which has a major computer system with the state, nor IBM Smith.

Lee Smith, state DP officer, said the five new centers would include business and service, human relations, revenue, law enforcement and state colleges.

A state colleges center is now operating

with CDC equipment; law enforcement, with RCA; and the human relations agency, with a mix of RCA, Burroughs and IBM. Smith said the three centers with mixed or non-IBM equipment would stay essentially the same for the present, although human relations center could undergo some changes during the initial 24-month period.

Benefits of the plan were described as: the availability of large computers to all departments; a single statewide network for sharing data; and the improvement of certain services to the public and local government.

The proposal has already received blessings of the governor and the California Information Systems Implementation Committee, a joint legislative-executive body established last year.

Satellite Minicomputers

The basic concept of the master plan is to provide a large-scale centralized computer facility with a highly localized satellite minicomputers to make available to all state users a portion of the central facility.

The approach would use a combination of remote batch entry, large-scale on-line interactive computing, massive data base storage, selected mini-computers to remote batch and typical standard DP operations.

One of the objectives would be massive conversion to standardize operations on the state's computers. A Computer Utility Rate Board would be established to set up rates and policies.

California has been studying ways to centralize its DP systems since 1965. A draft of a long-range master plan was drawn up in 1969 and was revised in 1970. But the final version remained dormant until the present version was revised this year by Smith.

The state is spending over \$83 million for DP during the current fiscal year and the amount is expected to increase to more than \$200 million a year by 1975.

People, System Certification Pushed

By Edward J. Brice
Of the CIV Staff

ATLANTIC CITY—The semiannual joint computer conference attendees are probably over what they are known today, and "we're at the crossroads" of major decisions on changes, according to Walter L. Anderson.

The incoming president of the American Federation of Information Processing Societies (Afips) acknowledged that the organization is considering a switch in policy, to have one national show per year, with the possibility of adding three regional conferences a year.

Anderson was elected president of Afips prior to the start of the conference. He will succeed Keith Unapher, who resigned from the Rand Corp. to form an Information Sciences Institute at the University of Southern California.

At a wide-ranging press conference, Unapher, Anderson and others of Afips discussed certification of programmers, the possible establishment of an office in Washington to lobby for the computer industry (see story Page 38), and the JCOP.

Anderson said his top priority when he takes office will be the joint computer conferences. Unapher sees the Wash-

ton "central office" as Afips' most important function, but said he had to spend more time on the JCCS than originally planned, because of economic problems.

The number of exhibiting companies has continued to drop over the last four conferences, although the number of paid attendees appears to be on the upswing. The total dollar value of exhibits and other items decreasing revenues from Afips and later this year the federation will be voting on whether to increase the number of full "revenue-sharing" societies from three to five.

The new Afips slate of officers, to be installed July 1, besides Anderson, who is head of General Kinetics, Inc., includes Dr. Robert A. Kudlich, vice-president, who is business area manager for air traffic control systems at Raytheon. Dr. B. B. Walker will replace Donald E. Walker as secretary, and George Glaser will take over the treasury from Robert W. Rector.

Doris Parker, chairman of the professional certification committee, announced a post-conference committee, now due June 1, to try to establish universal job descriptions.

The end product of this survey will be, to be released in August, on the typical tasks and skills of programmers, as seen by themselves.

The Data Processing Management As-

sociation, which awards a Certificate in Data Processing and which is not a member of Afips, was involved in some of the planning of this survey, Parker reported.

Regarding the systems certification effort, John Gordon said his Systems Improvement Committee was planning to be field-testing guidelines for security and privacy in November.

He likened system certification to the establishment of "building codes." The first systems review manual will be a book of questions and attitudes, not preconceived solutions, he noted.

Using the security guidelines proposed by Gordon's committee, Acknowledging the parallel effort announced by IBM Chairman T. Vincent Learson, Gordon and other officials said they could foresee sharing test information with IBM, but no formal combination of efforts.

IBM and Afips will employ the same approach, that of using test installations for the projects. IBM will be testing software and user access, however, and Afips will be testing the user's job descriptions.

Looking ahead to the Fall Joint Computer Conference, Dec. 5-7 in Anaheim, Calif., Anderson predicted the addition of a vertically oriented seminar package would have a positive impact on attendance.

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Learson Details Data Security Plan

(Continued from Page 1)

methods of accounting control, better education and training."

Under the security measures, access will be controlled by "locks and keys" and users will be assigned to their own thresholds according to their needs. The "locks and keys," he said, would be both hardware and software, but mostly the latter.

Training centers will be located where the IBM Resource Security System will be installed; the system will be fitted to IBM's OS/21, and tested in operational environments through the end of 1973, he said.

There has been little if any direct interaction with Afips on this project, he said. Learson indicated, despite the fact that the federation recently announced a major project to develop a "checklist" for using accounting new systems.

The checklist, formally known as a System Review Manual, will be designed to provide users with a list of security-oriented questions to be used in evaluating the adequacy of security.

The IBM approach will attempt to discover "a fair measure of how well the [user] is doing against particular [security] noted. Other considerations will be access control (logical and physical facilities . . . terminals, files, the whole question of user identification"), cost, ease of operation and so forth.

"We must take a look at our own kinds of memory in the computer in the room," he suggested. "The systems programmer and systems operator have privileged access" to the system, he added.

What is needed might be "techniques

that would control their using their special access to the system to obtain data they have no real need to know."

The IBM chairman may have been asked to speak at the time in the whole 20-year history of this industry have we ever stood at the brink of greater technological change in the makeup of systems."

These developments, he explained, "make it easier for us to learn to use, easier to program. They should make it possible," he continued, "for us to store huge data files and have easy access to them. And they should help us get on with new applications before the barrier, which has been cost."

Learson later told a press conference that these "breakthroughs would be chiefly in the area of large memories, to make programming easier. He did not specify any time frame for these developments, nor cost differentials or memory sizes.

What has caused built-in data security to become a "paramount" need, he said, was the development of applications into more sensitive areas, such as financial data, in large-scale programming, bases, time-sharing and remote access."

The flexibility planned for the user-studied security measures, he promised, will provide a "wide range of choice . . . as low or as high a threshold as you want to set." And what you are willing to pay for.

"Obviously, we are never going to build a system that is absolutely crackproof," he conceded, "but we can go a long way, beyond where we are now — and at a cost that will make sense."

Part of the reasoning behind this effort the desire to avoid "illy regulation" being contemplated in Washington, he noted. Any security standards developed and/or approved will be made public knowledge, even if IBM does eventually build them into systems or make them program products, he said.

User reaction to Learson's speech varied, from "belated" to "not an overriding concern" to "too much on software security, not enough on physical security."

Users did feel the "small segment" of the computer community involved in time-sharing or on-line data base management could benefit from the expenditures [see related story, page 37].

Government control would lead "only to a stalling of innovation," he commented. Regarding the data base issue, he said public policy must dictate "how much and what kinds of information" shall be collected, "who shall have access to it, and for what reason."

While there is little indication that computers are being used for spying, hacking and interconnected, particularly those containing private and confidential information, "it could happen, and that's what has people alarmed."

In this area, "fortunately," Congress is taking the initiative, regarding "the need for information on the hand side and the protection of privacy on the other."

The data security project will have direct effects on privacy legislation, he implied, since access is one of the chief questions facing the developers of data banks.

CW's Inquiring Photographer Asks...**Data Security: How Important Is It?**By Edward J. Bride
OF THE CW STAFF

ATLANTIC CITY — After IBM Chairman T. Vincent Learson's statement that data security was becoming a "paramount concern," Computerworld asked several computer users at the SJCC for their impressions of data security needs.

Their responses were requested as "personal," rather than policy discussions of their own plans. The question is: Does data security a growing concern, or is it being "overplayed?"

Isaac H. Lichten, ADP policy officer and telecommunications representative, Office of the Secretary, U.S. Department of Health, Education and Welfare.



Bergman



Holland



Abernathy

"The size of files, such as those Social Security uses, makes compromise difficult. They use literally thousands of tapes, and access is nearly impossible unless the user knows the ins and outs of the operation. In some cases, service may outweigh security considerations, and the end-user may have other needs, which he places above security of his own information."

Anthony R. Abernathy, systems support analyst, Cities Service Co.

"Separation from the computer room



Kemper

Cohen

make it easier for a knowledgeable systems engineer to gain access to confidential data. I see more users taking physical precautions, but in software, not so much. There is a fair chance that the only result of more software security will be more difficulties to get their data."

Mark D. Cohen, manager of computer science, E.R. Squibb & Sons.

"I don't see security as a major problem, except for the rare on-line user. In some instances, users can't even access their own data bases. Right now, most people operate in batch mode, and aren't too concerned over data security problems."

Joseph F. Kemper, production com-



Johnson

Peterson

puter systems designer, U.S. Steel Corp. "This is very definitely a problem, but in physical access more than data."

I've walked into computer centers where I am not employed, and have easily used the computers. You don't realize the potential something happens."

Peter W. Bergman, manager of automated graphics, Philco-Ford Corp.

"Any problems could be handled through OS changes; there are many tools available now. We developed our own security through passwords and sign-on/sign-off techniques."

William Holland, systems engineer/applications, Douglas Aircraft.

"I don't see this as an overriding concern, except on an individual basis as

isolated cases occur. The industry does have the responsibility to help solve the problem, and I'm sure IBM has studied the situation enough to know the need, even though the problem affects a small segment of the market."

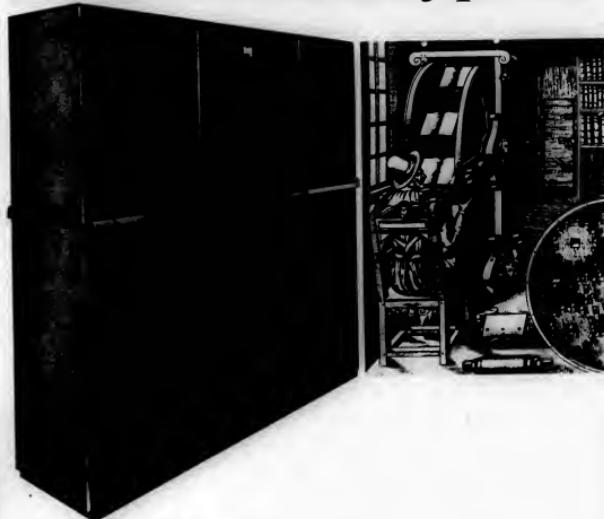
Carl K. Johnson, educational coordinator, Insurance Services Office.

"I see some areas where there's more desire for data security than need. The security study is probably behind, because of interest in financial management. Some programs are already available, however, both user-designed and from vendors. This is probably a growing concern among users, and it relates to the need vs. the desire to know certain things."

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'Supertoys' (Computers) Can Make Learning Process a Pleasure

By Don Leavitt
Of the CW Staff

ATLANTIC CITY — Education, on any level, can be more fun and at the same time more effective than it is and computers and computer-based devices are especially able to add useful pleasure to the learning process, according to Seymour Papert of MIT.

A mechanical turtle that draws designs on command, a CRT-based implementation of the language that drives the turtle, and a computer-based game called "Hangman," in which the program interacts in lively fashion with the user, while encouraging him to get the right answer.

Papert's concept of the purposes of learning.

Patrick Suppes of Stanford University illustrates the drift and practice capability of computers in his game of "Hangman," in which the program interacts in lively fashion with the user, while encouraging him to get the right answer.

Students had an undergraduate-level logic course had been known to spend as much as six hours at a time, he noted, in a terminal, working with a program provided by the school, to solve problems.

Confusing to Student

Today's educators are too often concerned with isolation of elements of a system, leaving the student utterly confused about the overall picture he should be getting, according to Marvin Minsky of MIT.

By using a computer to simulate animals, to build animals that don't really



Papert discusses computer-based toys that make learning both fun and more effective.

exist, the student can piece together the parts, as he understands them, to see the overall effect. He can see the interactions of the parts better than way than through the often abstract experience of, say, a mathematical derivation, Minsky noted.

The chief function of the supertoys, according to Papert, is to help the user become comfortable with the problem to be solved. Supertoys provide ways, through subroutine programming, by



(CW Staff Photos by M. Upton)
Minsky ponders an attendee's question, which the user can divide an otherwise uncontrollably large procedure into parts that are completely comprehensible. In this way, a bus is not a major catastrophe, or even necessarily bad, just surprising.

The unexpected results, often considered errors, can become the basis of new and exciting experimentation when viewed in this way, Minsky noted.

CAI Aids Technology, Not Instruction, Luerhmann Charges

By Judy Kramer
Of the CW Staff

ATLANTIC CITY — The potential of computers in education goes far beyond the traditional concept of programmed instruction. Computing is a "new and fundamental educational resource, not merely a new method of presenting old material," said Arthur Luerhmann of Dartmouth College at a session on "Computers in Instruction."

The speaker emphasized the pedagogical and philosophical aspects of computers in education, rather than the technology.

Luerhmann pointed out that although computer-assisted instruction (CAI) is certainly a more interactive form of teaching than people, it does not improve the content of the instruction, only the technology. There are many new skills unique to computing such as simulation, large-scale data base access and complex analysis that will add to a student's total education.

He commented that the additional cost of teaching computing along with traditional material will, in the long run, be offset by the added value of the education.

Elliot Koffman of the University of Connecticut described an intelligent CAI system in use there. He said the interactive system goes beyond frame-oriented, question-answer systems and attempts to teach problem solving on a very individualized basis.

Progress Monitored

As a student works on a problem, the computer monitors his progress, asking questions and providing remedial assignments. The student uses a "model" or program object which the computer uses to select the concepts to be taught, the level of the problems and the amount of monitoring the student requires, Koffman explained.

C. V. Bunderson of the University of Texas said large-scale CAI systems are more necessary as the cost of education rises and productivity of educational systems decreases. He proposed that computer-assisted educational systems do not replace the teacher but rather change the role of the teacher.

"Computers can be used to restructure curriculums to make the presentation more economical and more powerful," he said.

Bunderson described a "mainline courseware system" in which the student, not the program, controls the instructional process.

"First the student learns a taped lesson. Then, through a specialized keyboard with its own command language, he can elect to review the lesson, select an exercise, ask a question or be tested on the material."

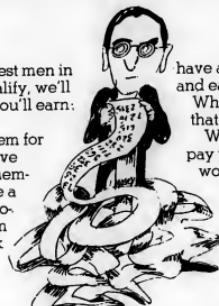
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Manpower Supply, Demand Figures Show Need to Strengthen Available Programs

By Molly Upton
Office of the Author

ATLANTIC CITY - Lack of reliable data makes projection of DP training needs and employment needs difficult, but the DP industry "cannot afford to give up and roll over and play dead," or end up in five years where the Bureau of Labor has the statistics," urged Aifips' Bruce Gilchrist in a session on "Manpower for Computers - Heyday or Cutback."

The Bureau of Labor Statistics at "got to get the ball so we can see where we don't get into trouble with the high-level trained personnel as we have with those trained in the lower levels," he continued.

Despite the difficulty of dealing with the complexity of a field that lacks job classification standards and which has been relatively ignored by government statistics, projections indicate the level of training offered is not consistent with market demand. Of the approximately 170,000 graduates in 1971, trained by primary sources for the computer user labor market, only 120,000 have entered the labor force, noted Richard Weber of Aifips.

The number of degreed programmers has doubled since 1966-67, and the number of bachelor programs has almost tripled, from 71 to 206, according to John W. Hambleton, of the Southeastern Regional Education Board. The number of graduates majoring in the DP field has quadrupled between 1966-67 and 1969-70.

"When these figures of supply are compared with estimates of demand, we see that there is no longer a need to encourage a crash effort to start new degree

programs," he said. "The need is now to encourage a long-term effort to start new degree programs." The Bureau of Labor Statistics' annual survey of occupations and industries, which includes a question on the number of workers in each occupation, will assist DP users to find out "what makes a site tick." Preliminary results will hopefully be available at the beginning of the next year, he added.

Margaret Cox of the Office of Computer Information at the National Bureau of Standards acknowledged the problem of job classification and said her department is working on it.

One can assume that government

and private definitions and the government can make these mandatory, but it's up to the profession to adopt the titles," she added.

When Setting Training Standards

High Priority Urged for Documentation

By Edward J. Bride
Of the CW Staff

ATLANTIC CITY - A data processing workshop recommended "not just the total cost of programming," not just the initial cost, and that is where good program documentation can be useful, attendees at an evening SJCC workshop were advised last week.

Arthur E. Hutt, vice-president and director of data processing at the Bowery Savings Bank, said the "days of documentation after a program is tested" should be over. "Programs that should not be done" when delayed, even Flores, organizer of the open session of program documentation, explained what he called a "line-for-line system" of documentation, which keeps the information near the coding, to facilitate change (among other benefits).

Emphasize Importance

Defining documentation as "information about a program that is necessary to change it," Flores suggested that professional groups such as the Association for Computing Machinery should continue to emphasize the importance of documentation when setting training standards.

Weakeness in training programs devised by both vendors

and users were criticized by Martin A. Goetz, a vice-president of Applied Data Research. Too often, he said, programmers are compensated, new programmers are not impressed with the need for documentation.

"You have to ram it down their throat," he said, "after they've learned not to document their work."

Speaking from the audience, Goetz also said documentation had low priority because programmers aren't given sufficient time for projects.

Facilitates Change

Another member of the audience praised Flores' "line-for-line" method, stating that having the documentation in the code, rather than in a separate document, greatly facilitates the process of change, as well as the actual documentation of the changes.

Flores called his method "in-program documentation," and explained how he established it: a description, within the program, of just what process is going on. Two types of "extra-program" documentation would be "summary" (introductory) and "detailed" (describing input and output files, and the directions a user or operator must perform to make the program work), Flores noted.

qualitative character of the DP profession will change; the bulk of the profession will be operating in a host environment of other professions," according to Vladimir Gerasimov, director of the Gorky Institute of Technology. There will be a theoretical discipline and a service industry, but the primary justification of data processing will be in problem-solving applications within the learned professions of law, education, medicine, health and government, he added.

In the near future, there will be a change in demand toward designers of user oriented systems rather than experts in unit processing.

In conjunction with this trend toward integration with other professions, changes must be made in both the education of DP people as well as doctors and lawyers, he added.

The Bureau of Labor Statistics is currently working on compiling a good base of employment statistics, and is conducting an occupational employment statistics survey, noted Neal Rosenthal, of the bureau. The survey will assist DP users to find out "what makes a site tick." Preliminary results will hopefully be available at the beginning of the next year, he added.

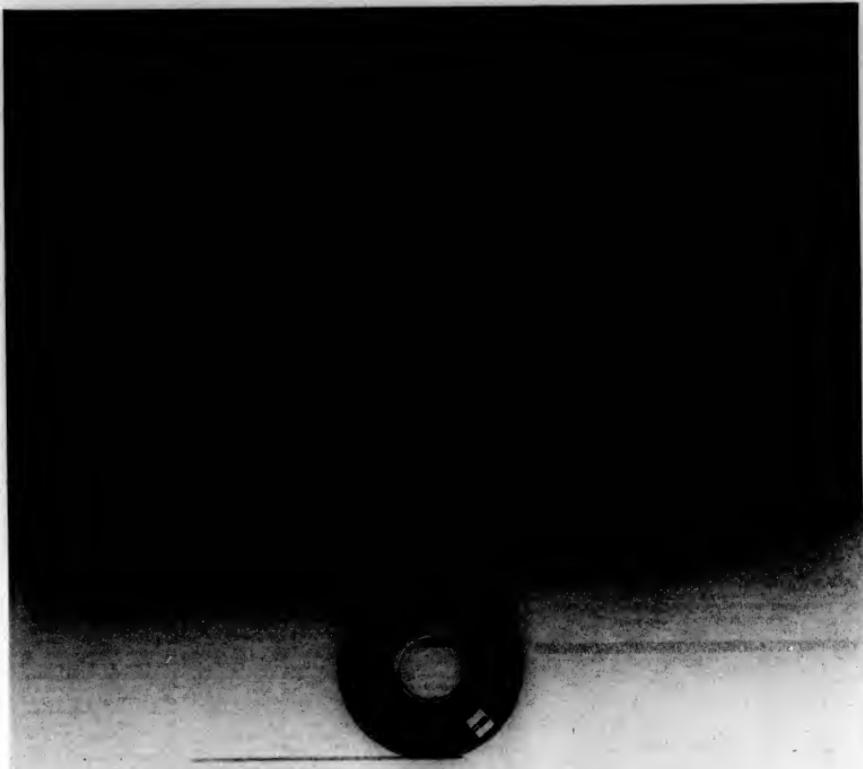
Margaret Cox of the Office of Computer Information at the National Bureau of Standards acknowledged the problem of job classification and said her department is working on it. One can assume that government and private definitions and the government can make these mandatory, but it's up to the profession to adopt the titles," she added.

Pastor Hutt said that, as a manager, he is "more concerned with extra-program documentation," so that all costs can be identified. Documentation should be a "normal by-product" of this area of management processes, he said.

Identifying programming costs, documentation will enable the manager to interrupt a project because of changing priorities, illnesses or other reasons, and not incur new costs from the interruption. In addition, documentation is easier to control than changes, but all areas must be given importance by managers and programmers, Hutt said.

Flores, a consultant and independent contractor, conducted the Wednesday session as a non-structured workshop because he was "discontented" with the format of other program sessions.

At each of the four Baruch College sessions throughout most of the two hours, at least two people were standing at each of the four microphones placed in the audience for questions.



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COMPUTERWORLD

Hardware Wrapup

New Mini Offers PDP-10 PowerBy Frank Pasta
Of the CW Staff

ATLANTIC CITY — A mini-computer, graphics CRT system, which reads a laser beam through a lens, and other hardware all contributed to make "variety" the catchword of the SJCC hardware display.

The first computer from Digital Computer Systems, the System 32, is said to offer performance equal to the DEC PDP-10, but is priced in the range of the PDP-15.

The general-purpose System 32 is designed for real-time use, multi-programming environment, 16-bit word length, 500-nsec cycle time, and a 32K byte MOS solid-state memory, expandable to 2M bytes, in 32K increments. Bulk memory can be used to further increase memory capacity to more than 8.5 million bytes, the company said.

Processor Architecture

The architecture of the processor includes six floating-point registers and two floating-point registers. The multi-programming hardware for dynamic program relocation, protection of system and inactive user programs and program reentrancy are included.

The instruction set includes



The Data Disc Anagraph system can combine graphics with alphanumeric characters.

single- and double-precision floating point, subroutine entry/return, string manipulation, table search and block transfer instructions. Six data types can be handled: character, integer, byte, half-word, full-word and single- and double-precision floating point.

The system also features automatic program input and hardware context switching as well as a concurrent processor and multiple I/O channel operation. A basic System 32 with 32K bytes (8K words) of memory costs \$59,900. Deliveries will begin in the fourth quarter of 1972.

The Anagraph from Data Disc, Inc. is a multichannel graphic display system designed to operate either on-line to an IBM 360 or 370, or off-line to a minicomputer. It can produce a page of 3,940 upper or lowercase characters in .3 sec. Graphics are displayed on a 640-by-480 individually addressable bit matrix, the company said.

Multiterminal System

The Anagraph multichannel system can be used as a multiterminal system driving up to 32 black/white displays; as a color system by combining channels

to drive the color guns of color CRTs; or the channels can be combined for form overlay or protected data displays.

Hardware consists of a video monitor, disk memory for display, refresh, an Interdata Model 70 mini as a dedicated display processor, disk data storage up to 2M words, keyboard multiplexer, power supplies and up to 16 remotely located keypads/microphones.

Software is system housekeeping functions as well as

tional core memory up to 32K, 7- or 9-track magnetic tape drives and paper tape or punched card output.

Computer Transceiver Systems Inc.'s Execsport 1200 operates at speeds from 10 to 120 char/sec and is available in a variety of forms ranging from the basic port to a complete system complete with modem and all electronic components.

The unit is an asynchronous



(CW Photos by F.J. Pasta)

The Creative Logic LV-2000 OCR reader incorporates a laser beam and fiber optics.

selected utility, applications and support programs are provided. The Anagraph is designed to emulate the IBM 2260 terminal and is compatible with 2260 soft-wares.

The Anagraph system will range from \$5,000-\$10,000 per terminal depending on the number of terminals required to be connected. Delivery is 180 days.

OCR Page Reader

Creative Logic Corp. exhibited an automatic-feed OCR page reader, the LV-2000, using a laser beam and fiber optics. Reading rates are above 3,200 char/sec, the company said.

Source data is processed on an IBM Selectric with special type fonts. The LV-2000 is a Laser Page which combines a modified barcode with alphanumeric characters.

The pages, which are 5 in. by 3 in. to 9 in. by 11 in. and feed at the rate of 10,000 lines/hour with an automatic vacuum feed with an optional double detector. Input buffer capacity is 150 sheets.

Operational features include selective field scanning and programmed editing and formatting. Special features include additional

serial impact printer that can produce up to five copies and an original on standard perforated paper from 3 1/2 in. to 14 7/8 in. wide.

The printer uses a printthead with 35 needles and a monolithic arrangement of 5 x 7 matrix. Electronic impulses actuate the needles, driving them against an ink transfer ribbon as the head is moved belt.

The asynchronous mode of the printer enables it to accept a continuous data stream without filler characters making it compatible with nearly all low- and medium-speed teletypewriters, the company said.

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serial impact printer that can produce up to five copies and an original on standard perforated paper from 3 1/2 in. to 14 7/8 in. wide.

An unlimited vocabulary is the chief attraction of the VS III Voice Synthesizer from the Vocal Interface Equipment group of Federal Signal Works.

The vocabulary synthesizes to construct the sounds used in spoken language. English is currently available, and versions that can "speak" any other language can be supplied, the company said.

Eight data bits, six phonetic command bits and two inflection control bits are required for each phone to be used. Typically, the company explained, there are as many phonemes in a word as there are letters. (Phonemes are the basic unit of speech and represent the individual sounds made by the speaker.)

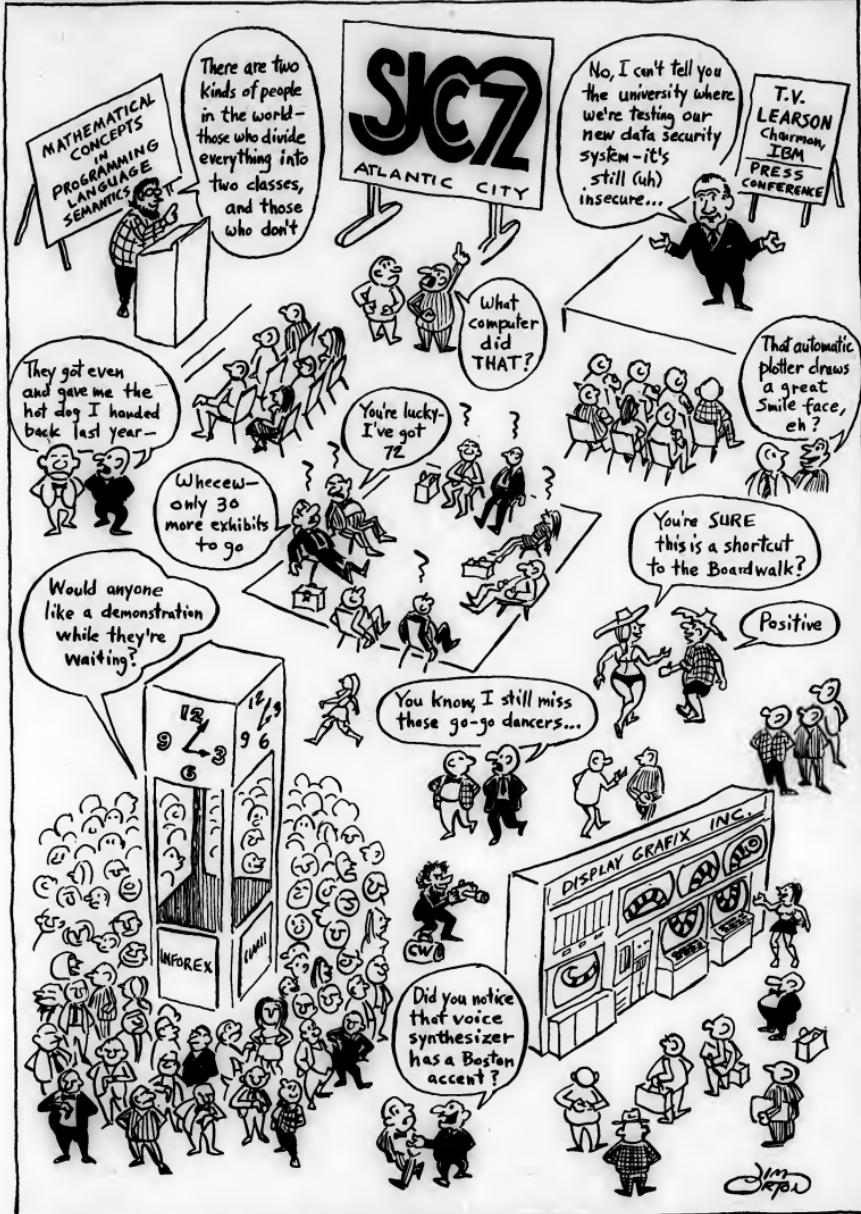
The VS III can be operated either with its own self-contained vocabulary or with a vocabulary stored in an external memory, retrieved and transmitted by a computer. The price of the unit is about \$3,500.



Computer Transceiver Systems Inc. president Allan G. Jacobson demonstrates the Execsport 1200 printer.

A Look at SJCC

By Jim Orton



Editorial**Policing the Police**

Acting FBI Director L. Patrick Gray 3d has said he will appoint a 12- to 18-member advisory committee to help guide the activities of the FBI. Members will include congressmen, social scientists, law enforcement personnel, academics and various other experts.

And New York Times columnist Tom Wicker has proposed that a bipartisan study be made of the FBI prior to the appointment of a new director. The group, to be composed of congressmen, law enforcement personnel, past and current heads of government agencies and representatives of the public, would come up with recommendations on how a secret police force should function in a democracy.

We think both committees are an excellent idea — provided that they each include at least one data processing expert who believes in using computers with restraint. The potential overuse or misuse of DP by the FBI is simply too important a subject to be left to persons uninformed of the hazards.

The Open Door**A Case Study—or How Not to Run DP Operation**

By Eberhard C. Stotko
Specialist in Computerworld

The system and data processing organization in a large corporation can be the source of unlimited frustration, excessive costs and excessive contention — or it can blend into its business environment as a valuable and respected component of the total organization.

Success or failure of DP efforts depend on numerous factors, but in their sum total they boil down to one single term: management.

Apparently the top management of a majority of corporations has not yet

Viewpoint

established a meaningful relationship with the resource "computer," which precludes the possibility of harnessing it in an effective manner. In terms of one of the more conventional resources of the "5M" variety, namely: men, machines, material, money and methods.

The case study of a typical large manufacturing company headquartered in the Midwest, presented here, strongly supports this contention. Although computer management comprises other aspects, the following comments are restricted to the organizational structure of the systems and DP activities and the underlying principles by which they are guided.

With heavy DP requirements at a divisional and corporate level, centralized processing was merely a question of degree when first considered by the company in the mid-'60s.

'Nerve Center'

The anticipated economic advantages of a corporate DP center over divisional installations led to the formation of a "nerve center" with over 35 computers under one roof.

Operating statistics proved almost from the start the corporate center permitted a greater machine utilization than ever experienced before in the company, and the new organization was soon heralded as the key to the achievement of an optimal price-performance ratio for computer jobs.

Now, only four years after completion of the center, it is being broken up organizationally, accompanied by a partial physical dismantling, to overcome the fact that this impressive assembly of computer power brought about:

What happened?

A number of things, some caused by inexperienced management, others by the

inevitable effects of size.

Maintaining machine utilization levels in excess of 90% for 24 hours a day, seven days a week became an obsession, because it was the only quantified factor by which the quality of the operation was judged by corporate management. With little or no safety margin for error returns, plus weekly, monthly and other periodic peak loads, it was only a question of time for the service level to deteriorate to such a point where the entire business operation was affected.

Priorities were established and delivery schedules were changed to suit the computer capacity. Some customers accepted this "rape by computer" in silent resignation, others designated their own job-changers who walked their particular job through the computer.

The ensuing traffic problem warranted a major study resulting in self-locking doors and restricted access to the computer area.

Modulating the work for over 35 computers became a task of almost unmanageable proportions, and verbal inquiries into the status of a specific job could no longer be answered.

The increased difficulty in assigning permanent computer users also caused a complete loss of "job identity" or even job familiarity.

Efficiencies brought about by repetitive exposure to specific jobs were lost. Programmers and analysts soon regarded it as a futile effort to try to locate and query the particular operator who handled a job which did not turn out right.

"Ego in One Basket"

The nightmare of dropping that single basket which contained all the eggs occurred when the nerve center collapsed shortly after it had been built. If disaster were to strike the nerve center, a major corporation would be rendered inactive overnight.

Even if the master files were to remain intact, it appeared unlikely that stand-by capability in application software could be made available on such short notice.

Adding to the burden of the already much-harassed managers of the data center, corporate management became impressed by the absolute cost of operating the center, and began viewing computers as a drain on the company's budget rather than as a target of a savings campaign. This obviously indicates a failure of the responsible staffs to properly inform top management of the role computers do or should play in the modern business environment.

The vicious circle of incompetent computer-management became very evident

in the budgeting scheme. Under the false notion of best obtaining management control over the usefulness of computer applications, all costs of the DP operation were assessed out to the customer.

This approach predictably created these three principle problems:

Lock of Formula

1. The absence of an exact and realistic formula for calculating assessment rates led to erroneous evaluation of system performance, discrimination against certain applications, development of some highly useful applications.

2. Budget planning and forecasting had to be done jointly with the area serviced. Most customers, however, could not clearly predict their requirements six to twelve months in advance. Therefore, the experience and knowledge of the DP manager determined whether the resulting budget was theoretical or realistic.

Corporate management, on the other side, failed to recognize that, if manpower and expense ceilings are fixed, the budget will be fixed. In the end, time and time again the DP managers were expected to perform an upward variable amount of work with a fixed budget.

Customers Changed

3. Because of the cost levying practice, customers were charged (directly or under cover-up titles) for computer runs due to programming errors, although the responsibility for program develop-

ment and maintenance rested with the DP center.

The case study gives reason for concern because:

- It happened within one of the top ranks of U.S. corporations, where one would expect to find the best know-how available.

- It becomes evident that upper and even top management is largely rendering only lip service to the significance of employing computers in a modern business environment.

- In such an atmosphere of toleration — but in absence of truly meaningful top-management directions — the systems and DP departments grew with a pretty autocratic attitude, with a substantial interest in self-promotion and with the latent danger of becoming a self-purpose. A confusing and misleading terminology was created and propagated, and vague vague concepts management information systems were advanced to justify another quantum jump in DP budget volume.

Unless we find ways and means to reduce the "achievement gap" between proclaimed computer capability and actual performance, general acceptance of the computer will spread among corporate management and prohibit or delay the application of the inherent computer potential to the real challenges of the manufacturing industry of the '70s and '80s.

Eberhard C. Stotko is an independent management consultant.

Letters to the Editor**Business Forms Salesmen Might Have Had Answers**

Alan Taylor's May 10 report headlined, "Readers Want Respect for Student, Teacher and Parent," evoked some sadness and some glee among many of the readers of COMPUTERWORLD.

Sadness . . . because none of the respondents suggested that a business forms "pro" might have helped the customer avoid such ridicule; glee . . . because more of your readers will undoubtedly seek a closer rapport with their forms designers.

J. Arthur Woodward
Woodward Associates Inc.
Fayetteville, N.Y.

'Keep Up With the Joneses'

Looking at the school report in the

Taylor Report [CW, May 10], it appears as if somebody finally is succeeding in catching up with the Joneses. After all, computers are up! Let's join the crowd!

I used to shake my head every time I'd read a headline like "Computer Industry Is Booming." It didn't seem to make sense. After all, everybody seems to have a computer these days. I'm afraid that the Joneses are evidently broke. I guess a lot of money is paid for consulting services, not to mention the extremely doubtful outcome!

What an excellent way to handle the taxpayer's money.

W. Ransberger

Cleveland, Ohio

Computerworld welcomes comments from its readers. Preference will be given to letters of 150 words or less. Letters should be addressed to: Editors, Computerworld, 797 Washington St., Newton, Mass. 02160.

Automated Tape Libraries

Current Hardware Kept in New Concept

"Automated tape libraries" are a recent development which can affect magnetic tapes and their future — and which particularly may obsolete many current decisions between disks and tape systems.

Two of these libraries are near delivery of their first products. One is located in New York, Colorado. The first library scheduled for delivery is being produced by Advanced Digital Systems (ADS) in Mohawk, N.Y.

Tape Delivered to Drive

The ADS Automated Tape Library consists of a minicomputer which takes in from the computer system data about what tape reel is needed. With a disk (either on its own, or on the main computer), the information is converted into the storage location where the reel is stored. Trolleys sent to this location bring the reel down to near the computer itself. Sometimes this is done by an overhead transport system which leaves the reel suspended over the tape unit, and sometimes by placing it at a conventional computer port.

After it arrives, the tape leaders receive a message as to which tape unit it is to be used, or as to whether or not it can be mounted on any free drive. All they have to do is take the reel from the automated library system and mount it.

ADS feels the system can be designed to cut the time to load a reel to approximately 10 to 30 seconds.

The calculations look good, and I like the system in general.

Xytec Corp. in Boulder, Colo., has a more completely automated system

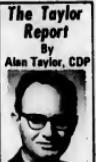
scheduled for early 1973 delivery. In the Xytex library the automation is carried further. Instead of the reel just being obtained from the library, and prepared for the operator, the Xytex system com-

pletes the loop, and actually mounts it on a self-loading drive. (This restricts the types of drives available, which the Xytex system is not yet compatible.)

Both ADS and Xytex systems are being sold with various incentives — such as the

mechanism because it still retains most of the comparative cheapness of tape storage.

(As a rule of thumb, Xytex estimates its equipment cost as approximately the same as the cost of the tape drives it



overhead transport



The connections which allow the minicomputer to give instructions to each tape drive are handled by one logic card, shown here by Frederick McNeil.

improved security of the tapes, the reduced operational requirements and the greater throughput through faster mounting of tapes. These are certainly valid, but even more important is their impact on disk systems — which previously have been the only mass on-line media. Tapes

supplies — so one way to consider the cost of tape mounted in such a system would be to simply double the standard drive costs.)

There have been other attempts at making tape an on-line medium, before the automated libraries, of course. Grumman's Mastape is one such instance — and there are others. These, however, required the user to employ special tape systems while the automated library concept makes no such demands.

With such a concept the user can handle

The Furr Challenge Roll of Honor

California State Polytechnic College,

Pomona, Calif.

Coleman College, San Diego, Calif.

Computer Education Centers, Los Angeles, Calif.

Control Data Institute, Long Beach, Calif.

Control Data Institute, Pasadena, Calif.

Control Data Institute, San Fernando Valley, Calif.

Control Data Institute, Southfield, Mich.

Corning Community College, Corning, N.Y.

Emily Griffith Opportunity School, Denver, Colo.

Fleming Community College, St. Louis, Mo.

George Washington High School, Denver, Colo.

Kirkwood Community College, Cedar Rapids, Iowa

Lake County Community College, Schererville, Ind.

Long Beach City College, Long Beach, Calif.

Oakland University, Rochester, Mich.

Tulane Junior College, Tulsa, Okla.

Virginia Polytechnic Institute, Blacksburg, Va.

Ware Associates, Hudson, Mass.

The schools above indicated they are

prepared to compete with all-comers

regarding the excellence of their data processing educational courses. All honor to them!



The tape is taken from a preloaded position, then it is moved to the drive and the mounting arm is connected so that the load instruction can be given by the minicomputer. Richard Sills of Xytex Corp. demonstrates and Alan Taylor checks the timing.

the systems as either normal sequential units or as on-line systems. He does not have to lock himself in — and that is the important part of the new concept.

The concept could lead to a battle between tapes and disks for the on-line disk market. While there are great advantages of price, this is really unlikely to happen. Disks still have the fast access which is not practical on current tape units, and which is needed to handle on-line applications.

It would appear then that in a fight between tapes and disks for the on-line market, disks would beat tapes even though tapes can now be automatically mounted.

But in data processing, simplistic solutions are often not the best ones. In this case, while it is being demonstrated that the minicomputer can control the majority of the answers, and the tape providing the economy of storage that will make really large data bases practical.

This development of tape/disk/data bases is particularly important since it removes the economical argument on all three sides of the tape/disk debate. In the past, data base shortcomings have been justified by saying that since users must hold all data on disk, and, since disks are so expensive, data processors have the right not to hold full records, even though the user may suffer from the resulting inaccuracies.

In a joint tape/disk/inquiry system, the most frequent answers to inquiries are held on the disks, but when either the accuracy of a given answer is questioned, or when unusual questions are asked, the system can go back and pull out full records.

That is much preferable to the current methods of inquiry handling which often involve working through the day-by-day records, or through thousands and thousands of pages.

Of course, one of the points about the success of an on-line tape system, or more likely, an on-line tape/disk system, is that it makes the amount of data that can be obtained within a given time frame very important. Obviously, if the data is available when the user wants it to be, then the system becomes more efficient. But that is a whole new story which I will discuss later.

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Schools Rise to Furr Challenge

The latest news on the progress of the Furr Challenge Cup Contest, which is open to challenge schools in the U.S., shows that many schools across the country are prepared to challenge Coleman College's claim as "the best data processing school in the country" (see Roll of Honor).

Cole Furr, the originator of the challenge, commented that it was a decent list. "But," he continued, "where are all those schools with the great advertising

senior programmers, project leaders, senior management and data processing managers?"

A scholarship is available annually to the students from the local Racine/Kenosha Chapter of DPMA. Six members of DPMA sit on the school's DP advisory board in awarding scholarships, software grants, stipends, Cobol and RPG as the prevalent languages used in the area, these are the languages taught by the school.

K.T.I. does not have a placement director paid by commission. The school has a waiting list each semester of high school graduates, veterans and some college graduates who want to work.

During the Wisconsin state competition in 1971, K.T.I. won 11 of 12 available categories in data processing. At the national competition in Indianapolis, Ind., K.T.I. entered three of four available categories and won three first-place awards. In 1972, K.T.I. won 20 categories at the Wisconsin state competition out of 22 available categories.

A few of the nationally known firms hiring K.T.I. students in the area are: American Motors Corp., Jockey Mems, Inc., Case Co., Snap-On Tools, Western Publishing and Eaton Yale & Towne, Inc.

I have contacted the DP director at K.T.I. and informed him of the article and the opportunity to compete for the Furr Challenge Cup.

Now, here's hoping that K.T.I. will join in the Furr Challenge Contest. To compete, write to Paul Sakido, Fotomat Corp., San Diego, Calif., for details. Closing date for entries is July 1. Alan Taylor.

The Professional's Viewpoint

CPA-Like Certificate Gets Good Reader Reviews

The May 3 Taylor Report suggested that a CPA-like certificate might be useful in data processing has triggered several ideas in our readers.

In general, most readers appear to welcome the concept as a real advance, although they advise some points they want considered. One reader, however, disagreed — saying it would be of no use unless it were claimed, "There is no market for it; no one would buy it."

More positively, however, here

The Professional Viewpoint page is prepared by the editors of Computerworld in cooperation with the SCPD.

are some other views expressed. Your opinions will be welcomed, and should be sent to the Professional Viewpoint Page, c/o Computerworld, 79 Washington St., Newton, Mass., 02160.

Help for 'Poor User'?

The auditing of programs and systems against standards is an area almost nonexistent in data processing.

It has always been considered demanding by an analyst to suggest he stick to standard practices. First, he thinks you're restricting his initiative and imagination. Second, he claims he does all those "good things" anyway.

You don't have to do much to do with data processing to realize this is not the case.

I feel that, like accounting, EDP would benefit by the knowledge that the system must be audited against certain standards.

The one who would benefit the most is the up-to-now "poor user." James Boughner, Supermarket General Corp., Woodbridge, N.J.

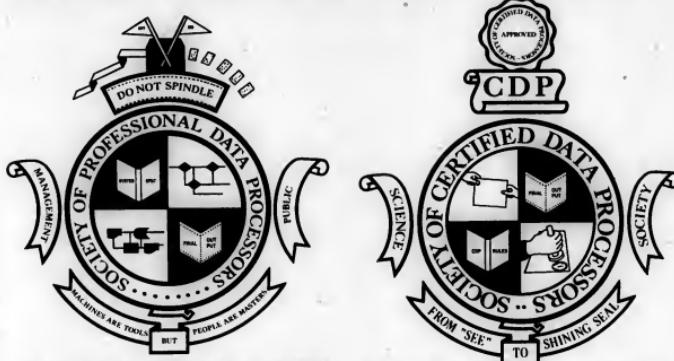
Ethical Base Needed

I think it is important that all of us in the industry seeking professional standing realize that, while standards, a body of knowledge, education, experience and ethics are all necessary for professionalism, what is really needed is of general principles or ethical base.

Professionalism implies a dedication to some set of guidelines which are agreed upon by the individual or the corporation at any point in time.

The maintenance of these standards must be done by people who change the standards consistent with a philosophy which runs counter to the technical problems to which the standards are being applied. Perhaps a more appropriate view is that the standard itself is embodied in morals and ethics of the people, rather than merely technical norms. It is merely examples as to how that ethical "standard" is applied in specific situations.

The question remains, of course, even if you believe my concept is a "good" one, how toward professionals? As to how to implant such ideals in us somewhat cynical practitioners. The answer seems to lie in the educational process itself. Contrast that to us data processors, who don't care to suffer at all,



One way in which the difference between the DP professional society and the CPA-like role suggested for the CDPs can be illustrated is shown above in the two seals. On the left is the actual data processor extending from system configuration to final output; while his authority is symbolized as being the right to demand that his systems in operation are not sabotaged. On the right, the very different certifying role suggested for the CDPs is illustrated as starting

but merely wanting the gravity immediately.

As I read this letter, I sound almost evangelical in my approach, as did the Billy Graham of data processing: I'm really a graying-seeking cynic like the rest of the gang. I do see, however, that until we begin drafting the "ethical standards" for the profession, the search for professionalism will frustrate us all. — Joseph L. Podolsky, director, Equity Systems, San Francisco, Calif.

Audit Systems Too

The certificate under discussion is not intended to be a guarantee of professionalism in data processing only if it is used to assure that business and industry users that the systems as well as the programs they are using have been examined by a person with the same experience, coupled with the requisite training, to enable that person to state unequivocally that the user's data processing is being performed with adequate controls, safeguards and utilizing efficiently the equipment the user is given.

I also feel that any audit of a DP accounting system (done by an outside CPA) should include an examination of the systems and programs utilized, to be done in sufficient detail to prevent fraudulent manipulation of data or accounts.

If this were established as the minimum standard to be met to obtain the certificate of a holder of the CDP title, there and only then would it be worth the certificate that the CDA places on his report of audit.

This leads me obviously to a further qualification of the second question. I firmly believe that the professional-level examination should be devised so as to determine the candidate's

only when someone asks him to look at a system that is already working — when he then checks against a rule book before he issues his certificate. His authority, symbolized by a seal of approval, is simply to give or refuse his approval. The drafts certainly make the points vivid. What are your opinions — about either the roles of the two societies or about the suggested costs-of-seals?

tion should test the individual's knowledge and attitudes regarding professional standards and ethical conduct. — Fred W. Felzer, manager, Data Processing Bureau, Toledo.

CPA Comments

I feel that Alan Taylor and probably many CDP-holders fail to recognize the significance of a CPA certificate. A CPA certificate is nothing more than a license issued by a governing body of the state allowing its bearer to express an opinion on a financial statement.

In order to obtain a CPA certificate a person must pass a rigid examination and must achieve a certain level of experience, but the purpose of these requirements is to maintain the quality of the CPA's opinion on the financial statements, not to place a premium on the holder of the CPA certificate.

The role of the data processor is quite different. First, few data processes with the exception of those we've discussed are independent contractors, are independent of the person to whom they are selling services of their employer.

Second, the accounting profession has great standards of quality control. During this period of time, a set of auditing standards and a set of accounting principles has been developed. No such set of performance standards exists in the data processing field. Without such a set of guidelines, a CDP certificate is of little value except to say that a person is able to pass an examination.

Professionalism is a state of mind and is not legislated. Just giving a person a certificate does not make him professional. The dictionary says a professional is "characterized by or

conforming to technical or ethical standards of proficiency in performing according to such standard exists. By this definition, data processing is not a profession. Therefore, data processors cannot be professionals if data processors are to create professionalism at its first stage. — Dale W. Harrell, CPA, Pioneer Hospital, Artesia, Calif.

Certify CDP Firm

I agree we do need two societies. I have had the feeling that for some time now the CDP program has not been guided in the direction Taylor suggests. Rather, the CPA firms have staffed "management services" (EDP background) to perform various checks against "accounting" work. However, when asked for an opinion on standard DP techniques, not accounting related, their standards to judge are only as strong (or weak) as the person doing the checking. In some cases they may not be EDp people at all!

In order to be successful, we must establish standards of quality and check them that are as realistic and consistent as those established for the accounting profession.

The answer, of course, is the Society of Certified Data Processors and the Society of Professionals in Data Processing. I can forward the latest annual report published by a company contains the certification of the CDP firm saying that "acceptable" accounting procedures were followed and the certification a CDP firm certifies that its accepted EDP procedures were followed.

I think this should be one of the major goals to be accomplished. — D.R. Collins, CDP, KCL Corp., Shelbyville, Ind.

Communications Wrap-Up**Modem Changes Frequency For Better Error Control**

By Ronald A. Frank
Of the CW Staff

ATLANTIC CITY — A modem series that allows a user to "shift" his transmission frequency when high error rates occur was introduced by Tel Tech Corp. at the SJCC. Called a "throughput machine," the modem series combines digital synthesis and spectrum selection to allow the user to shift his transmission path through four frequencies in 200 cycle steps. The company exhibited a 4,800 bit/sec version at about \$5,500, a spokesman said.

The modern operates at speeds up to 9,600 bit/sec on conditioned lines and up to 4,800 bit/sec on 3002-pair unconditioned lines for first delivery in July.

Com Data Corp. exhibited its Series 330 data sets which are compatible with Bell 103 and 113 units. The 330 can be equipped with an adapter to house up to 16 DAs, thus eliminating space-consuming wall-mounted couplers, a spokesman said. Price of the 330 begins at \$3,000 depending on the number of modules required.

Teltype Corp. displayed its 10 char/sec modem which can operate with models 33, 35 and 38 Teletypes. When ordered as part of a new teletypewriter, the model costs \$1,995, a spokesman said. The modem can be field installed at higher cost.

The data set is compatible with Bell 101, 103 and 113 units, but must be operated with a DAA, even though the company is an AT&T affiliate.

A 2000 bit/sec modem for both dial-up and private lines was on display by GTE Lenkurt. Designated the 26U-1200, the unit features loop-back and carrier detect diagnosis and costs \$495.

Sangamo's T4800B data set, which can operate "on most" dial-up lines, features adjustable equalizers capable of equalizing most unconditioned lines."

Computer Picked Girls, No Jury

WICHITA, Kan. — The spirit was willing but unfortunately the girls were a little too young to be a jury during the trial.

The two sisters, ages 10 and 14, said they "really got excited" when the registered letters arrived for them, but according to administrative Judge Howard C. Kline of the Sedgewick County District Court, "adults" kept "the computer rolls into the privately operated computer produced the under-age candidates.

the company said. The unit costs about \$4,000.

A multipoint modem with automatic and adaptive equalization was unveiled by Codex. Equalization time for the unit is rated at 50 msec "without any cascaded sections or repeaters," the firm said. The Codex 4800, costing \$5,575, uses Quadrature Amplitude Modulation which eliminates the need for separate pilot tones on carrier and timing recovery.



(CW Photos by R.A. Frank)
Sangamo T4800 gets a thorough inspection by Walter Aydelotte.



S.J. Puchkoff shows Codex modem to Gerald Dubois, Communications Systems.



Monty Strohmeyer takes a look inside the Com Data 330 data set.

A Special SJCC Announcement:**IBM agrees to maintain 360 CPU's with selected Fabri-Tek extension core memory attached.**

IBM has recently formalized by letter to Fabri-Tek a policy for continuing maintenance of certain 360 CPU's which have been modified by the addition of Fabri-Tek extension core memories.

IBM has inspected Fabri-Tek's alterations and additions to a number of 360 system types, and determined that continued IBM CPU maintenance is practical. System types inspected to date are as follows:

S/360 Model 22 to extend memory capacity to 64K;

S/360 Model 30 to extend memory capacity to 64K;

S/360 Model 40 to extend memory capacity to 448K;

S/360 Model 50 to extend memory capacity to 1 million bytes

IBM will continue to maintain these CPU configurations in the normal manner throughout the United States and in locations outside the U.S. where IBM has an existing service capability. IBM has further confirmed a willingness to inspect any new alterations or attachments to CPU's not included in the above list, and to add them to approved configurations for service as they qualify.

24-hour service in over 125 cities.

Fabri-Tek 360-compatible memories are maintained by a network of more than 1,000 service representatives in over 125 cities in the U.S. These service representatives are employees of Sorbus, Inc., the contractor for 24-hour field maintenance of Fabri-Tek extension memories since May of 1971.

Fabri-Tek also provides a company field support

program for end-user memory maintenance. This support program functions with regional service managers and memory specialists deployed in key locations, and provides direct factory support to the Sorbus organization.

There are presently over 120 installations of Fabri-Tek 360 extension memories in the United States and Canada.

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ICW Photos by V.J. Farmer
Grafpen draws eager tasters.



Resistors demonstrate the effectiveness of their Trac language primer.

SJCC Sights



Milgo's Sheria assembles hardware users.



Diablo operates HyType I printer in plexiglass case.

Data General provides on-line terminals to Nasa 820 mini.

Value System Vital to Programmers

By E. Drake Lundell Jr.

Of the CW Staff

ATLANTIC CITY — The problems facing programmers and the intellectual and aesthetic rewards of programming are apparently worldwide, observed Dr. Andrei Ershov, professor at the Minsk University and a corresponding member of the USSR Academy of Sciences.

Highlighting the SJCC luncheon last week, Ershov said "it is obvious that in order to cope with the serious problems of our profession, one must take stock of ourselves in the mirror of public opinion, but must also probe inside ourselves."

"The present is a time of difficulty for programmers," he asserted. "The technical work is to be done in laboratories, wages less so. The romantic aura surrounding this inexcusable occupation is, if it ever really existed, beginning to fade."

Spring Thaw

"Software houses are meeting like snow in spring. Professionals accustomed to being strongly in demand now find themselves waiting in the books of the employment agencies," he said, adding that these problems have appeared in Russia as well as in the U.S.

"Even the claim of programmers to be a special breed of professional employee has come to be disputed. Still more significantly," he added, "the software overgrowth, overgrowth of programmers is slipping into the paws of administrators and managers — who try to make the work of the programmers planned,

measurable, uniform and faceless."

Ershov said, however, that the subordination of programming to big enterprise is "an unavoidable fact." He added there is "a certain danger in converting programming into a means of increasing the efficiency of management, which is a highly paid subgroup of the working class." If such a tendency is to be resisted, a program must find some system of inner values in his specialty, values which will help him both to assimilate industrial working methods and, when necessary, to defend them if they do not fit.

Such a system of values, Ershov postulated, is "inherent" in the profession.

These values, he said, are involved with the professional status of programmers and with the aesthetic rewards from pursuing the profession.

Programming, he said, is the "most humanity difficult of all professions involving numbers of men" for the following reasons:

a) Programmers constitute the first large group of men whose work brings them to those limits of human knowledge which are marked by algorithmically unsolvable problems and which touch upon deeply sensitive aspects of the human condition;

b) His work as a programmer is challenged to combine, with the ability of a first-class mathematician to deal in logical abstractions, a more practical talent enabling him to build useful engines out of zeros and ones, alone."

Feeling for Aesthetic

Because of these peculiarities, "an understanding, a feeling for the aesthetic of

Assembler Level Language Rated High for 'Efficiency'

By Don Leavitt
Of the CW Staff

ATLANTIC CITY — Benchmarks prove that object code generated by assembly-level languages is more efficient in run-time execution and storage requirements than object code generated by higher-level language compilers, Dr. James O. Henrikson of the University of Michigan told an SJCC technical session on "Techniques for Developing Large Programming Systems."

Efficiency is just a concept, he admitted, and the assembler level programming, while performing so well, may have required a larger staff and more time than the same logic written in high-level language.

There are other ways to improve the efficiency of large systems, other parameters of assembly language, an approach to project management and a re-evaluation of the use of conventional, rather than special-purpose hardware, in the light of much improved readily available software.

There must be complete separation of responsibility between staff members assigned to development, integration and testing, Dr. Robert Worrall of Computer Science Corp. said. The staff may communicate with each other on common problems but decision-making under this plan must fall to a knowledgeable and involved project manager.

'Commodity' Pricing Works

ATLANTIC CITY — In a multi-user computer installation environment, a home service charge is the most effective method of assuring efficient system usage is by charging for the data processing "commodity," according to a panel at the SJCC Installation Management session.

Dr. Ronald Rutledge of Carnegie-Mellon University said there is "no incentive" for customers to "use the system efficiently"

At the University of Michigan, programs in Fortran-H ran 2.7 times as long, and used 2.7 times as much storage as assembled programs. PL/I programs again compared to assembly took 7.4 times as long to execute and used 4.4 times the code.

At Systems Development Corp., Jovial programming ran 2.5 times longer, and took 2.6 times more storage than assembled coding. Fortran programs took 2.7 times more run time and 2.7 times the storage of assembler-generated object code.

At Brown University, the special language for computer installations (LSD) showed less degradation, but still ran 2.1 times longer and used 2.6 times more storage than assembler logic. Jovial programs at this site took 2.5 times as long to run and used 2.6 times more core than the lower-level program code.

Fortran V and Sleuth programs at Westinghouse had similar results. More disk space is needed, he said, to control assembler coding as it is being developed, but it is worth the extra cost.

The tests, particularly those at Brown, suggest, however, that system development languages are "the way to go," he concluded.

until a "price for the commodity" is implemented.

In a computer utility where users have terminals, Rutledge would recommend charging extra for work handled "over the counter." This acts as a deterrent to time-sharing handling of cards, paper or other media.

Implementation of this extra charge has resulted in a switch in the Carnegie-Mellon system usage: 96% of the work is entered through teletypewriter terminals, Rutledge reported.

Another panel agreed that elimination of card handling increases operational efficiency. Arnold W. Pratt of the National Institutes of Health said terminals are used for data entry for 90% of the NIH computer work.

Rutledge, a third panelist, Slawomir Fernbach of Lawrence Livermore Laboratory, agreed that one of the major problems facing computer utilities and other large users would be in software development.

Fernbach suggested the utility "cannot be put in the position of relying on manufacturer software," and should either develop its own software or look to end-users — customers — for this software.

Pratt suggested that problems in "specialized software" would afflict real-time-type users, and said successful system usage can be achieved in the medical field through the development of medical language programs.

Software developed at NIH helped eliminate the security-of-access problem, Pratt reported. At the institutes, there are 40 separate computers and, in one instance, three systems share on-line access to one central disk file.

A panelist also addressed the data security issue. Robert Mannas, president of Robert Mannas Associates of Dallas, said data privacy is no longer just a responsibility, but "it's a task" to be performed.

Growing efficiency of on-line mass storage amplifies this problem, he indicated, adding that privacy concerns both internal and external users. Corporate and customer data must be kept separate, he said.

SOFTWARE SERVICES

Random Notes

Census Data Available Through National CSS Net

STAMFORD, Conn. — The full national set of First Count, File A of the 1970 census data, is now available on the National CSS time-sharing network. A data retrieval system called Census, developed by Becker & Hayes for use on the network, can access up to 400 items of population and housing data for 285,000 block groups and enumeration districts throughout the nation.

Population and housing counts, age, sex, race and family relationship profiles, and other demographic conditions are among the data items included, net-work spokesman said.

Major Analysis Techniques All Included in 'Statpac'

AUQUIPA, Pa. — Most of the major statistical techniques are included in Statpac, the Statistical Package Extended, from University Software Inc. Four basic areas covered include regression and correlation, analysis of variance, questionnaire evaluation and discrimination.

Statpac is written in Fortran IV and requires a 100K partition or region on a 360, and a disk drive. The company is at 221 Princeton Drive, 15001.

Data Digitized, Recorded

BEDFORD, Mass. — Virtually any form of data, such as "bar code" can be digitized, recorded on magnetic tape and analyzed with the Pictorial Analysis Facility service from Information Design Inc.

The service can distinguish 256 shades of gray, and picture sampling can be as fine as 256 by 256, 512 by 512, 100 or 200 microns. Cost of the service is negotiable, depending on resolution and whether analysis is also wanted. The firm is at the Civil Air Terminal, 01730.

PPE Option Monitors CICS

CUPERTINO, Calif. — An Expanded Module Analysis Option, now available for the Problem Program Evaluator (PPE) packages from Boole & Babbage, provides a means of monitoring for program modules loaded by IBM's Customer Information Control System (CICS), versions I and II, in an OS environment.

The option also extends PPE capability by increasing the possible number of analyzed modules from 127 to 256. The option costs \$1,800 in addition to the normal \$1,800 cost of PPE. Boole & Babbage is at 18990 Homested Road, 95014.

OK for Special Jobs

Pay-as-You-Use Software Increasing

By Don Lewitt
Computerworld

Paying for software from outside vendors based on the number of times the package, or parts of it, is used, may soon emerge as an alternative to one-time sum payments and to monthly lease fees. At least three vendors now offer products on a usage basis.

This approach, generally used for billing on work done in commercial data centers, has long been advocated by some industry observers.

"Metered Approach"

Applied Data Research (ADR) has offered a "metered approach" to the use of the Autoflow flowcharting package for about a year. Bonner and Moore Associates made available a "usage agreement" for its financial planning package, FP/70, several months ago. Computer Communications Sciences Corp. (CCS) has also announced unit pricing plans for both the Project Planning System (PPS IV) and the Transportation Optimizer (Top).

Despite Cisco's statement that unit pricing is the proper approach to software financing for "most application pack-

ages," those programs on which it is

available, including Cisco's, are specialty offerings not really intended for regular, repetitive production use. In addition, each of the vendors still offers fixed-price sums in case users find the "priced by use" costs getting too high.

The accounting methods used by the three vendors have some interesting similarities and differences. ADR, for example, whereas Bonner and Moore charges by how often each processing module is used and by how many print lines are generated.

ADR's rate/statement drops once a base

number of statements has been processed during a billing period, and the user is subject to a \$100/mo minimum charge in any case. Cisco also has a decreasing unit charge as usage increases, but charges no minimum.

No Minimum

Bonner and Moore, because of its approach, does not provide a cut-rate for high use, but neither does it charge a minimum.

Each vendor has a billing routine to generate a statement. ADR notes that its statement shows exactly which features were used and how often.

ADR's rate/statement drops once a base

APL Processors for DEC PDP-10 Released by Independent Vendor

PITTSBURGH — The capabilities of APL for both scientific problem solving and business DP are now available to users of the DEC System-10, with the release of basic and extended versions of APLSS/APL from APL Software Systems Inc.

Both versions contain all the primitive functions and program features found in APL/360, and programs using the standard IBM-coded capabilities can be handled directly by these processors, a spokesman said.

128K Maximum

Beyond the standard features, however, are included a dynamically varying work space and a variable-sized symbol table. The work space under APLSS/APL may be anything from a minimum of 3K to a maximum of 128K, 18-bit words. IBM's maximum work space is 32K bytes of storage.

Both the basic and extended APLSS/

APL processors also support accessibility from teletypewriter and Selectric-based terminals, execution-mode line-editing and Scan operator, the spokesman added.

The extended version also includes a file manager with access to internally formatted sequential or direct access files, or to ASCII files which can be used by Basic and Fortran programs as well as by APL. The system supports disk, DEC tape and printer devices.

Four new operations including simplified Formatted output, program writing are also available in the extended processor, the company said.

The APL versions operate under DEC's standard monitor in a minimum of 64K words of memory. The basic version can be leased for \$300/mo, while the extended version costs \$600/mo. Permanent lease plans are also available.

The company is at P.O. Box 7108, 15213.

SBC Offers Fixed-Price Option

NEW YORK — Users with heavy work loads on the Service Bureau Corp. (SBC) System 370 can now lease their system by paying CPU time and power on a Fixed-Price Processing Option from SBC.

The option allows the user to buy parts of the 370/155's capabilities, each part described as 1/64th of the CPU resources of the machine, or to lease parts for a flat monthly cost, on a 12-month agreement. The user may buy as many of these parts as he needs and, in addition, may use up to twice his committed fraction at no additional cost, if the system load permits.

With option access to the CPU is organized around five-minute time slices. A user's work is automatically reentered in the dispatching queue until it has

exhausted his allotted share of the CPU time, and then any time he is able to gain on a reservation basis, up to double his normal time.

He can get no more during that time period, but is free to use the machine as long as it is "up" every day.

Another option provides dedicated lines to the SBC processor, committed time, again for a fixed monthly cost.

The Fixed-Price Processing Option costs \$2,750/mo for each part the subscriber wants guaranteed to use him. The dedicated line option is available on 30-day or 12-month agreements. Price varies with high-speed demand, ranging from \$810/mo for 10 to 15 char/sec on a 12-month plan, to \$1,265/mo for 30 char/sec on a 30-day plan.

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'Autofile' Creates, Controls Data Base, Supports Business Use of PDP-11

WAKEFIELD, Mass. — Business DP operations, particularly in the data entry editing and file maintenance areas, can become markedly easier on the DEC PDP-11, with the Autofile package from TLM Systems Association.

It can be used to create and maintain data bases through interactive or batch processing. Thus far, it does not support random access files, TLM admitted.

A simple specification sheet is used to define the elements of the data base at the time of its creation. Within the definition, the user may indicate which elements are to be checked against a variety of common data entry criteria.

With this capability, the user

may, for example, check for all-numeric or non-numeric fields, decimal point alignment, double- or triple-precision integers, or Mod-10 check digits, without having to recompile every application program that uses the field.

User exit facilities are provided in the edit routines to accommodate any special editing capabilities the user may wish to add.

The package supports addition of data bases, changes to user-defined specifications, and generates a detailed audit trail on the system line printer or other output device.

Updation is not done in place on disk files, but rather through generation of a new file. Thus backup files are immediately

available in case of problems, a spokesman explained.

Fields can be added to the data base without disturbing applications that use only the fields that are added to the end of the pre-existing records, a spokesman said.

A module allows the user to access the data base created by Autofile with minimum alterations to current application programs to support the use of the VOS operations on the data base and presents the records to the user program for processing.

The package is available for a one-time charge of \$1,000, which includes maintenance and any revisions recommended by clients in DEC's DOS.

The firm is at Two Smith St., 01880.

Requests for 15 Reports Handled in 1 'Sadie' Pass

PITTSBURGH — A report generator, the Select and Display Information Extracted (Sadie) system from Aptech Computer Systems Inc., can produce 15 reports in one pass of the user's file.

Each report has its own selection criteria, sort sequence and custom format. Up to nine lines of title, header and footnotes are available with each printout.

The load-and-go system can produce sum, counts, averages and standard deviations at specified break or eject points.

Card, Tape, Disk

'Sadie' uses card, tape or disk files as input. Indexed sequential files may be opened at a specified key and processed up to another specified key. Coded data from the user's files can be expanded into text equivalents.

Vendor Improves 'Aedcap' Package

WALTHAM, Mass. — Features recently added to Aedcap (Automated Engineering Design Circuit Analysis Program) have extended the applicability of this interactive simulation program for nonlinear electronic circuits, according to its originator, Softech, Inc.

The new features are sensitivity analysis, both dc and ac, and wave form analysis. The latter analysis also includes an approximation of the standard deviation of any circuit voltage of interest.

Information on in-house installations may be obtained from Softech, Inc., 391 Totten Pond Road, 02154.



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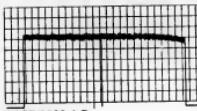
Earlier this year, we picked twenty-five 3200 fci premium tapes at random and tested them for output.

The tapes were by BASF and four other major makers. The criterion was the National Bureau of Standards Amplitude Reference Tape.

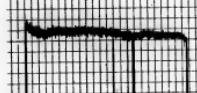
Test results? BASF/2000 A.D. was far and away #1 in uniformity — bit to bit, reel to reel.

BASF/2000 A.D. was also #1 in output. Our tapes were the only ones above the Standard 100% line.

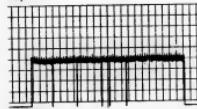
If you look right, you'll notice four typical charts and traces from the test. You can see others in a special booklet we've just prepared. (It's yours for the asking.) You'll also see the reason for our double win:



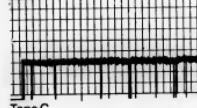
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Tape B



Tape C

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Computer Products



COMMUNICATIONS

Data Briefs

Tally Adds Datascribe Compression Feature

KENT, Wash. — Tally Corp. has introduced a magnetic tape Communicator feature for its Datascribe terminals which allows the use of data compression techniques at 1,200 or 3,600 bit/sec.

Using both serial and parallel data compression, the Communicator feature allows transmission rates "up to a maximum of 1,100 char./sec," Tally said.

The Communicator provides double buffered four type terminals: 7- to 8-bit code conversion and automatic answer, as standard capabilities. With 7-track tape at 1,200 bit/sec the unit costs \$273/mo. A 9-track tape unit costs \$293/mo. And, 3,600 bit/sec speed costs \$25/mo more in either version. The Communicator is available in 60 day delivery from \$301 South 180th St., 98031.

ICC Holds Technical Seminars

MIAMI — International Communications Corp. (ICC) is sponsoring a series of data communications seminars in various cities.

The all-day sessions provide data users with technical information related to the selection and use of modems and multiplexers. Included are discussions on modulation schemes, bandwidth utilization, an explanation of common phone line problems such as crosstalk, longitudinal imbalance, phase jitter and carrier distortion.

Various equalization methods are presented at the seminar, together with typical system configurations and telephone service offerings and line characteristics.

Sessions will be held on the West Coast in June and a July series in the northeast is being planned, said. A seminar schedule is available from ICC at 7620 N.W. 36 Ave., 33147.

Incomter Has Bisync Package

NATICK, Mass. — The Incomter SPD 10/20 intelligent CRT terminal can be made compatible with the binary synchronous communications techniques in a new software package.

The SPD 10/20 operates in point-to-point and multiple-drop environments and, with the Bisync package, transmits and receives in transparent or full-transparency modes.

The Bisync capability is available with standard SPD 10/20 singles or duals. A one-time \$3,800 charge is made by Incomter for the customized software. The firm is at 6 Stratmore Road, 01760.

Phones as 'Terminals'

CPU/Voice OKs Customer Credit Sales

By Ronald A. Frank

Contributing editor

CHICAGO — For any department store, credit purchases can be a headache. Each purchase must be checked against a list of approved accounts and if the process takes too long, the customer may lose interest and leave.

At Carson Pirie Scott, 6,000 charge accounts are processed daily via a Wavetek audio response system tied to a 360/350. The operation hinges on the use of more than 1,000 Cross-Tone phones at the company's main store and its 12 branches.

When a customer shows a Carson salesclerk a charge card for a purchase, the clerk dials a special number direct to the 360. If the account is in good standing, the CPU will authorize the sale and issue a unique approval number which is transmitted to the audio response unit. A

"voice" will then give the approval number to the salesclerk, via telephone, to proceed with the sale. The clerk records the approval number on the sales slip.

As approvals for sales are given by the 360, the CPU automatically subtracts the sales amount from the customer's credit. Customers receive a printed card notice of his credit limit with the monthly statement. When his purchases exceed this amount, the computerized voice will stop authorizing sales.

But when the 360 spots a questionable account, it is switched to a CRT operator in the credit department. As soon as the credit operator at an IBM 2260 CRT "picks up" the call, by depressing a lighted button, the 360 displays the questionable account information on the screen.

The operator then picks up the CRT operator takes only seven seconds and the salesclerk remains on the line.

With the displayed data, the credit operator immediately knows whether the customer has exceeded a particular purchase limit or whether the customer's bill is past due or whether any of several restraints on the account have been met.



(CW Photo by R.A. Frank)
Carson operators check problem accounts.

operator can update the data from the keyboard.

The CRT operators have 25 seconds to advise the salesclerk whether to accept the purchase, authorization manager John Marus says. If there is an unresolved question, the CRT operator instructs the salesclerk to hold the call and make up to three calls to offer to explain the problem. If a recent payment has not been recorded in the 360's account file, the operator can update the data from the keyboard.

The Touch-Tone authorization system enables every salesclerk to become a terminal operator via a simple keyed instruction sequence, according to Bill Smith, DP manager.

ICA Attendees Hear RCA Plan

For Shared-Line User Group

DALLAS — About "30 billion characters of data," for computer entry are being generated each day at five million remote locations, according to Anthony L. Conrad, president of RCA Comm. Speaking to about 450 users at the 25th annual meeting of the International Communications Association (ICA), Conrad said most of this remotely generated data is being entered off-line.

As one method to increase communications efficiency, Conrad urged users to consider the formation of joint user groups to share communications facilities.

The user group proposed by Herbert Granger of American Express, which would pool "existing corporate communications networks," was called stimulating by Conrad.

"Under this proposal, one company would be responsible for the construction, network management and maintenance," Conrad said. "Users would continue to pay 'Ma Bell' directly for their leased facilities." Conrad said, "and participating companies would save 20% to 30% of what they are now spending" on communications.

During the ICA conference, RCA Globecom held a briefing for interested users outlining plans for a joint user group of about 40 firms operating approximately 1,000 systems in 25 cities.

RCA has been formulating plans for forming a joint user group for some time to take advantage of the sharing provisions of AT&T's private line tariff 260. Under this plan, RCA would oversee the operation of a nationwide network of shared low-cost communications facilities.

RCA Globecom would provide computerized network design and management features has been announced for the 3780.

One of the fastest terminals in the IBM line, the 3780 improves on most features of the earlier 2780 data transmission terminal, which operates at 4,800 bit/sec. The 3780 reads up to 1,200 card/min and prints up to 423 lines/min compared with 900 card/min and 240 line/min for the 2780.

The terminal handles binary synchronous communications from remote sites to 360 and 370 CPUs installed at central locations. The 3780 can also talk to 2770, 2780 and other 3780 terminals on a point-to-point basis.

A terminal comparable to the 3780 is the Data 100 Model 70 which costs about \$510/mo. The Model 70 can transmit at 9,600 bit/sec, has a card punch and uses data compression techniques. None of

these features has been announced for the 3780.

The new terminal has two 512 character buffers which service the transmission line at 1/4 sec alternately for overlap operations, IBM said.

Portions of the 3780 are built from "reconditioned or modified equipment," but there is "substantial new engineering in the electronics," an IBM spokesman said. While the company will not comment on which parts are recycled, old ones removed, said the new terminal appears to be composed of a refurbished 2772 control unit, 2501 card reader and 2203 bar printer.

A typical 3780 data communications terminal will be available in July at a monthly rental of \$1,000/mo. The cost for the 3780 is \$29,000. But users can select the 24-month extended-term plan which costs \$815/mo, or less than the earlier 2780, which is not available on the extended plan. Purchase price for the 3780 is \$25,450.



Who solves data hang-ups for 14 phone companies?

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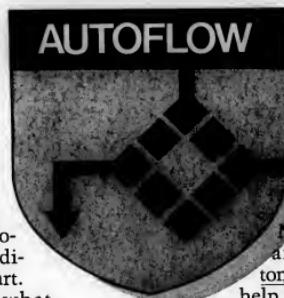
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SYSTEMS & PERIPHERALS

Bits & Pieces

Hardcopier Uses Video To Reproduce CRT Images

SUNNYVALE, Calif. — The Model 76 Electronic Hardcopier from Informax reproduces CRT images on 8-1/2-in. by 11-in. paper directly from video tape.

The Model 76 is a self-contained desktop unit about the size of a typewriter. It generates printed pages from the same signals which drive the CRT; no interface or controller is required.

The Informax 76 is priced at \$3,750 and is available on 90-day delivery from 757 N. Pastoria Ave., 94086.

Rack Holds Printout Binders

CHICAGO — Active printout binders, which do not require a printer, can be kept at a desk for quick referral in Mini-Rack by Wilson Jones Co. Mini-Rack takes up less than 1-1/2 sq ft and can be rolled into a well of the desk. Binders can be removed from either the top or side. Each Mini-Rack holds up to 100 printout sheets, 14-7/8 in. by 11 in.

Mini-Rack is also modular. It can be stacked up, down and out, limited only by the space available.

Price is \$39.95 complete from 615 Touhy Ave., 60648.

System Provides Process Control

DEL MAR, Calif. — Non-Linear Systems, Inc.'s Compac Computerized Process, Acquisition and Control system is a data acquisition and process control system which functions as an extension of the computer processor itself.

The Compac system is an extended minicomputer that communicates with external process circuitry and data transducers via interface hardware.

The system, designed for \$10,500, includes a 300-point, 2-wire analog input multiplexer, a high accuracy analog-to-digital converter, 64 digital input/output channels, a program data display, a 16-bit minicomputer with 8K of core memory, a teletypewriter and a complete software system.

The company can be contacted through P.O. Box "N," 92014.

Smaller Bits

MOTIAR, Hamilton, Ohio, announced that its Tapeguard Safe, designed to protect EDP data from heat, humidity, theft and vandalism, has been awarded the Underwriters' Laboratory four-hour label.

The Soundoff Dampener Model 1111, designed to reduce the noise level of Teletype 33ASR and Telex 32ASR units, is available from Van San Corp., Los Angeles.

Extended Memory Users See Fewer Problems

By Frank Plante

Contributing Writer

360 users who have installed, or are planning to install, extended memories on their CPUs can breathe a little easier if maintenance problems with IBM continue to decrease.

Most of the extended memory users report that their customers have had little or no problem with IBM's acceptance of their add-on units. The significant exception is the 360/30 modification that was the basis for recent court action between IBM and Intel.

The oversize 360/30 continues to be handled by IBM on a "best efforts"

basis. Fabritek reports its installations have been approved for the following models: the 360/22 to 64K, the 360/40 to 448K and the 360/50 to 1M bytes.

Oversize memory installed by Computer Investors Group (CIG) has been approved by IBM. According to a CIG spokesman, 22K, 360/22s, 64K, 360/30s, 256K, 360/40s with 512K, 360/50s have been approved. But CIG has an agreement with IBM for continuous maintenance on oversize 40K and 50K pending approval of CPU modifications, he continued.

Intel customers have not had any problems with IBM maintenance, Intel said. All its installations have been approved, if not for normal maintenance, then at least for "best efforts" work, which is unverifiable, according to the spokesman.

Most of the manufacturers say more and more users are showing interest in the extended memory concept since the Intel IBM court case.

The number of users extending their 360 memories has been rapidly increasing, with one company reporting it had sold more systems last month than it had in any previous month.

Mini-Based

NCR System Provides Retail Data

DAYTON, Ohio — NCR's latest computer system is a minicomputer-based "in-store" real-time system designed specifically for retail store chains.

The NCR 725 retail control system is made up of the 725 minicomputer and a variety of NCR 280 and other terminals to collect point-of-sale data and provide up-to-the-minute reports to management.

An important feature of the system to retailers is its ability to operate at the terminals and gather data in case of communications interruption or computer malfunctions.

The terminals used with the system are special versions of the 280 which are used in place of cash registers and can be equipped with handheld price pads to read data from tags.

The terminals are connected through a data concentrator which can handle as many as 40 terminals.

As many as 15 data concentrators can be attached to a single system for a total of 600 terminals per system. The system is designed so that all the terminals in a

store could be handled by a single concentrator. The concentrators, in turn, would feed data into a regional headquarters where the minicomputer would be located.

The 725 minicomputer has a cycle time of 1.2 μ sec/16-bit word. Memory is expandable from 16K to 32K words in 4K increments.

An NCR 260 terminal is used at each store in order to communicate with the system at the management level. The thermal printer on the 260 could be used for such reports as current totals of sales, merchandise distribution and item counts.

The system will also provide credit authorization at the point of sale.

Communications between the data concentrator and the minicomputer are handled over 4-wire voice-grade channels with a line speed of 1,200 bits/sec, asynchronous. The lines between the 280s and the 260 terminal must remain within the store and are 4-wire dedicated digital links. NCR declined to specify the data rate.

over this link.

A variety of communications methods and speeds are available for transmission of data to large central EDPM systems or to a version of the 725 mini designed specifically for simultaneous polling of multiple stores at speeds up to 2,400 bits/sec. If communications between the data concentrator and the minicomputer are interrupted, or in case of system failure, data is stored automatically at the data concentrator on magnetic tape cassettes for later transmission to the system.

The 725 minicomputer has a base price of \$20,200, which includes a magnetic tape unit, disk unit and monitor. A typical system for three stores including data concentrators ranges from \$43,000 to \$55,000, depending on the reports, communications and other capabilities required.

Rental prices range from \$1,300 to \$1,800 per month. The NCR 280 terminals are priced at \$3,470 each.

First deliveries are scheduled for March 1973.

Data General Novas Offered on Lease

GAITHERSBURG, Md. — Data General Nova minicomputers will be available on a lease or rental basis from Rental Electronics.

The rental company will make the units available under a variety of plans including rentals for periods from one month to one year, leases from one to three years and rental conversion programs allowing customers to apply rents as payments against purchase of leased equipment.

A Nova 1100 RPI 1100 with 8K 16-bit words of core memory, teletypewriter and interface rents for \$768/mo. The lease rate on a one-year basis would be \$3,920/mo.

Systems are available for immediate delivery.



It Splits

Two Detacher machines from Moore Business Forms, for detaching single- or multiple-part forms as well as carbon copies, are now available. Both models detect, slit margins and stack forms. The 488 provides an imprinting feature. The 488 is priced at \$3,500 while the 488 sells for \$4,195. Delivery is six weeks from 900 Buffalo Ave., Niagara Falls, N.Y., 14302.

Graphic CRT System Uses Color Monitors

SUNNYVALE, Calif. — A computer-generated graphic display system with color monitors is being marketed by Data Disc, Inc. The Model 6500 Television Display System is a multichannel disk refreshed display system that uses RGB color TV monitors.

By using separate channels to drive the three primary electron guns in a RGB color TV monitor, the system designer can display complex graphics in as much color complexity as is wished.

A 1-channel system would sell for about \$3,500/channel, and a minimum 4-channel system is priced at \$14,090. Delivery of standard systems is 90 days from 686 West Maude Ave., 94086.

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Minicomputer-Based Litton 1281 System Offers Business Users Ledger Card Data Processing

CARLSTADT, N.J. — A magnetic ledger business minicomputer, said to have the largest memory and fastest processing speed ever seen added to the 1200 Series of electronic business systems by the Automated Business Systems Division of Litton Industries.

The ABS/1281 can store 4K words in its central processor and 1,199 digits on each side of the memory. Striped ledger cards pass through its magnetic station. The system can print at speeds up to 35 char./sec.

Priced under \$25,000, the ABS/1281 automates such functions as payroll, accounts receivable and payable, invoicing, inventory control, sales analysis, job costing, general ledger distribution, Litton said. The system will be available for delivery in June.

The magnetic memory stripes on the ABS/1281 ledger cards provide a fast access to the central processor that is

useful to businesses processing nonsequential, random information, such as receivable and inventory items, Litton said.

An optional reader/punch unit is also offered to provide automatic data input and output using paper tape or edge-punched cards.

Additional flexibility is provided by a selected, automatic ledger card ejection feature that discharges randomly processed cards upward for individual filing by the operator, or downward for automatic, full-file, sequential processing.

A complete alphanumeric and 10-key numeric keyboard provides a means of data entry that can be mastered by any office employee, the firm said. The alphanumeric section of the keyboard is similar to a standard typewriter to facilitate entry of data combining words, symbols and numbers; the 10-key segments allow fast, accurate entry of all-number data,



The Litton ABS/1281 is a mini-based system using ledger cards.

Litton said.

The ABS/1281 is being offered with a set of software programs and utility, maintenance and card-sorting routines.

STORAGE TECHNOLOGY CORPORATION

The 3M 936 disk pack is compatible with the IBM 3330 disk drive.

User Can Buy/Lease 3M 3330-Type Packs

ST. PAUL, Minn. — A disk pack for use on the IBM 3330 and compatible disk drives has been introduced by 3M Co.'s Magnetic Products Division. The Scotch brand 936 disk pack can be leased or purchased at a 25% savings, the company said.

The leasing program is the first offered directly by a disk pack manufacturer for IBM 3330-compatible packs, 3M said. Lease rates start at \$25/mo for a one-year lease, with substantial discounts for longer terms. A purchased 936 disk pack costs \$750 in single unit quantities.

The price of the 3336 pack from IBM is \$1,000. It is not available on a lease basis, IBM said.

The 936 pack has 19 surfaces for data recording and one prerecorded servo control surface. Each surface is protected by 3M's "crashguard" coating, a formulation of chemicals designed to prevent oxidation particles which results damage to the disk surface and read/write heads, according to 3M.

Laboratory tests have shown, 3M continued, that "crashguard" coating reduces the possibility of a head crash. And, in the event of a servo error, the coating minimizes the after-crash buildup of oxide debris and contamination on the read/write heads, 3M said.

Datex 40 Punches Card Data to Tape

HOUSTON — A high-speed, card-to-punched-tape converter from Datex Corp. is now available for the Model 40 tape drive, the company said. The converter, the Model 40 CTP, combines the flexibility of punched cards with the low cost, simplicity and reliability of paper tape.

Datex Corp.'s unit combines the advantages of high speed (punch to 72 char./sec; read 40 card/min), compact design and low cost (base price of \$6,500).

Paper electronics allow changing to any desired tape codes quickly and easily. Card formats with up to 40 characters are decoded in the self-contained reader, with unwanted characters detected and eliminated from the tape.

Service for both the reader and punch units of the Model 40 is available nationwide. Delivery of the system is 60 to 70 days from 6119 Jessamine, 77036.

Itei Sets Delivery Dates For 370-Compatible Units

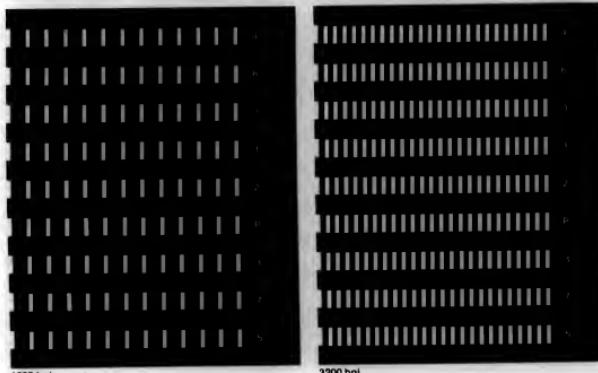
SAN FRANCISCO — Itei Corp. has announced the initial delivery dates for its 370-compatible solid state, add-on memories.

Memories for the IBM 370/155 will be delivered July 15, 1972. Units to fit the 370/160 will be shipped starting Dec. 1.

The company will start delivering its memories for the 370/145 April 15, 1973. The units for the 370/135 will be delivered beginning July 15, 1973, Itei said.



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COMPUTERWORLD

societies/user groups

Probst to Keynote DPMA

NEW YORK — The Data Processing Management Association (DPMA) has adopted a new format for its annual conference next month, with the introduction of "vertical" or special-interest, industry-oriented seminars.

The opening morning of the meeting, June 27-30, will be devoted to specialized seminars in the following industries: banking, insurance, manufacturing, retailing and transportation. Tuesday afternoon tours of typical installations are scheduled.

Management and technical topics will comprise the more traditional conference agenda for Wednesday and Thursday, with additional tours Friday.

Gerald G. Probst, president of the Univac Division of Sperry Rand Corp., will deliver the keynote address June 28 in the grand ballroom of the New York Hilton Hotel.

The exposition will also take place at the Hilton, with the seminar program held in the room between the Hilton and the adjoining Americana. A total of 48 seminars will be presented, plus the industry-oriented seminar/tour package.

The regular sessions will be given twice daily to facilitate attendance at a greater number and to provide a greater diversification of topics, DPMA said.

On-Line Picks Papers

UXBRIDGE, England — Over 200 computer specialists submitted papers to On-Line '72, the international symposium and exhibition of interactive computing, to be held here Sept. 4-7. Abstracts were approved for 120 of the papers, with about 30% coming from the U.S. and 40% from the UK.

Calendar

June 26-27, New York — First Annual Government Data Systems Conference, sponsored by the Division of Business and Management of New York University. Contact: William A. Kulok, New York University, Division of Business and Management, Suite 2G, 1 Fifth Ave., New York, N.Y. 10003.

June 26-28, Dallas — Ninth Annual Design Automation Workshop, sponsored by ACM, Share and IEEE. Contact: Herbert M. Wall, H.M. Wall Associates, 809 Massachusetts Ave., Lexington, Mass. 02173.

June 28-30, Denver, Colo. — Third Annual Conference of the Computer Micrographics Technology User's Group (Comteg). Contact: Comteg, P.O. Box 25605, West Los Angeles, Calif. 90025.

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Groups Cite Cheek, Other DPers

PARK RIDGE, Ill. — Robert C. Cheek, president of the Chicago-based Telecomputer Systems Corp., has been selected for the 1972 computer sciences man-of-the-year award by the Data Processing Management Association (DPMA).

The holder of 10 U.S. patents in communications and electronics, Cheek has written more than 30 technical papers and articles on information systems and computer-related subjects.

He is best known, according to DPMA, for his planning, construction and subsequent management of the Westinghouse

Telecomputer Center, one of the first facilities to use the computer successfully in controlling a large Teletype network.

Cheek will receive his award at the DPMA International Conference and Business Exposition.

Raymond E. Monahan, director of the standards applications department at Control Data Corp., has been elected president of the Standards Engineers Society.

The Federation of NCR User's Groups elected James Krautkremer president at the federal-

tion's annual meeting in April. Krautkremer is manager of MIS for Midland Cooperatives, Inc., Minneapolis, Minn., and served as chairman of the annual meeting in Dayton.

Dr. Robert Spinrad, director of information sciences for Xerox Corp., has been appointed general chairman for the Fall Joint Computer Conference, to be held Dec. 5-7 in San Jose, Calif.

Dan O'Brien of the Federal Reserve System has been elected president of the Mark IV User Group.

The mother instinct.

Once upon a time, you bought all your memory products from that one company. It may have been the most costly way to go. But there was that waltz feeling of security, of being taken care of. Ever since you started to buy memory products from other sources, you've missed that feeling.

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System Designed to Reduce Back Office Paperwork

CHICAGO — In order to cut the delays associated with brokerage firms' back office order processing systems, the Midwest Stock Exchange Service Corp. (MSESC) here is offering the Signet 80 communications system.

Based on 80-7000 communications processing system and 80 CC-30 communications/display terminals from Com-

puter Communications Inc. as well as GE Terminet terminals, the system provides for fully automatic stock order handling for MSESC customers.

Aimed directly at significantly reducing the time required to process securities orders and related back office paperwork, the nation-wide communications system handles orders for all listed and Nasdaq securities between any broker and any major stock exchange.

Terminals on Floors

Signet 80 terminals are located on the floors of major exchanges and will receive orders and transmit execution reports in a matter of seconds.

The Signet 80 network presently consists of four independent private networks, each assigned to a separate brokerage firm. There are over 80 CC-30 communications/display terminals on this high-speed network, spanning brokerage offices in locations in New York, Illinois, Texas, Mississippi, Alabama, Georgia, Florida, Virginia, Tennessee, Ohio, North

and South Carolina, Pennsylvania, Massachusetts and New Jersey.

The terminals are connected by dedicated leased AT&T voice grade circuits operating at 1,600 baud in a polled, multistation mode.

The Terminate teletypers are used to produce hard copy on order executions for filing and for mailing on a confirmation basis.

"Availability immediately of hard copies of the execution reports (including complete dollar computation) helps eliminate much of the back office difficulties which have plagued the securities industry over the last few years."

Quick Confirmation

"This means that a registered representative anywhere can now phone his customer, often within minutes after the customer has placed his order, tell him the order has been received and how long it will take to the brokerage house, and a confirmation of the transaction can be mailed to the customer within the hour," accord-



Signet 80 system assesses paperwork burden for brokers such as those on the Midwest Stock Exchange.

ing to MSESC President David Ruben.

As the Signet 80 network grows, new terminals will be installed at a rate of about 15 a month, but, it could be more rapidly.

"Depending on the size of the firms which select our service, the monthly installation figure could go beyond 70 instead of the 15 we project for smaller sized customer firms," said Dick Sharbaro, manager of customer sales for MSESC. The system now uses leased lines with four-wire service with an average of 8 to 10 drops to a line. No multiplexing is involved with the current network, but, as customer concentration and specific geographical areas continue to grow, multiplexing will be added to provide additional line cost savings.

DP Monitoring System Gives Early Warning Of Firms' Operations

NEW YORK — A computerized monitoring system provides The American Stock Exchange and its 547 member firms with early warning information on their operational controls, back office performance, money management, and other financial data.

When completed, about 40 statistically derived yardsticks of performance are sent to managing partners, so they can compare their firm's performance with others.

High Rate of "Fails"

Facs can pinpoint such conditions as high rate of "fails" or failure to deliver stock certificates within five business days, errors in submitting clearing information, stock record breaks and inaccurate security counts and transfer delays, according to developer Richard M. Brodsky.

Firms that are found to have a problem are required to explain the reasons for the difficulty and present a plan for its solution. The developer says the information is called before the operations committee of the exchanges board of governors.

Data from Facs is also being used to formulate productivity measures for seven categories of firms.

Information on median dollar value of transactions by various types of firms, daily transactions per representatives, and median number of items handled per operations employee enable firms to judge their productivity against industry norms.

Telstat Head on 'Plate' Slate

NEW YORK — Penny Kanichides, president of Telstat Systems, Inc., New York, has been chosen by the American Academy of Achievement to receive the Golden Plate Award during the eleventh annual tribute to excellence weekend, July 6-8, at the Salt Lake City.

Kanichides has created a computerized financial-information service which "offers 200 facts on more than 12,000 securities."

Theresa Brown enters order on Terminal as John Baker of Rotan Moles brokerage house watches.

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New Range of Better A/V Materials Aids DP Educator

According to results of a project headed by Dr. James Hill, Michigan State, some individuals learn best through audio instruction, some learn best through visual instruction and others by peer instruction.

In his report to the IBM Symposium for Deans of Schools of Business (Endicott, N.Y., November 1971), Hill explained his approach for measuring the "cognitive style" of individuals. Cognitive style is defined as the way a person learns and solves problems. When he became president of Oakland Community College, Hill implemented the system for all students of the Detroit suburban college.

Cognitive Style Map

A cognitive style map is developed by a series of a series of diagnostic tests and personal observations by instructors and counselors. The results are input to a program processed on the school's IBM 360/50. The resulting cognitive map enables counselors to design an instructional program best suited to the special learning capabilities of each student.

The cognitive map is separated into three parts:

- The symbols that the person recognizes.
- The cultural factors which affect interpretation of the symbols.
- The methods of making decisions based on interpretation of symbols.

Hill's work has important implications for instruction, both in industry training departments and academic institutions. More emphasis is needed on individualized instruction to meet the special learning capabilities of each individual.

In earlier years, the approach would have been unfeasible, due to the development cost for such instruction. However, audio/visual (A/V) materials, which are good tools with which to implement individualized instruction, are now available at a modest cost.

Audio/visual materials have

been used in university-level courses during the past three years. The new materials are so improved that we have redesigned the curriculum to use audio/visual materials at the core of the curriculum, rather than peripherally.

Principles and concepts are taught through audio or visual approaches, depending on the learning characteristics of the individual student. We also tested the approach in industrial training, with good results.

Because of standardization in teaching principles and concepts through use of media, teaching

of advanced materials is simplified.

Most important, the faculty is relieved of teaching basic materials, enabling more time to be devoted to application of these materials. Accreditation standards include a specific number of contact hours, however, faculty members. Most schools meet this through lecture. Use of the media frees faculty to use its contact hours more effectively — in faculty/administrative system development projects.

Students begin with hypothetical cases, move to design of university administrative sys-

tems, then work on actual projects in industry. Use of media gives faculty the time to supervise these projects. Previously, lack of faculty supervision discouraged industry from allowing students to undertake actual system development projects.

The new products are listed in the Annual Guide to Audio/Visual Materials for Data Processing Instruction, Box 9630, Colorado Springs, Colo., 80909 (\$3).

Cougar is professor of computer and management science at the University of Colorado.



J. Daniel Cougar
On
Education

a person learns and solves problems. When he became president of Oakland Community College, Hill implemented the system for all students of the Detroit suburban college.

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Success Causes Problems

Plant Processing Eases Production Paper Problems

By Paul R. McGarr

Special to CW

GREENSEASIDE, N.J.—The booming success of a fabric mill here, while gratifying to corporate management, caused a paperwork nightmare on the production lines that could only be solved through the introduction of a new computer system.

The sales at Guilford Mills have more than doubled in four years to a yearly figure of \$53 million, but the growth in order volume caused headaches on the production lines.

Fabric awaiting packing piled up. At each wrapping table, as rolls were wrapped, a man called the piece number and yardage for each roll into a microphonophone.

Several microphones were going at once, and the girls who filled in longhand shipping papers frequently had difficulty hearing the correct numbers. The errors

were compounded when the shipping papers were later used as source documents for customer invoices.

In order to overcome the paper bottleneck so the packing lines could handle increases in volume, the firm installed computer-based data entry systems that relieved packing line employees of all direct contact with the production volume.

The first system installed at Guilford Mills' main plant in 1970, consisted of a process control-type computer, an IBM 1800 data acquisition and control system, six IBM 1077 data entry units and three printers.

Over a six-day week, working two shifts at a time, the main plant now ships an average of 450,000 pounds of fabric, and has peaked at over 500,000 pounds with the system.

Previously, the plant averaged 340,000 pounds for a six or seven-day week with heavy overtime, and still had to shut

down the finishing operation periodically to allow the packing line to catch up with production volume.

A similar system was installed at nearby Oak Ridge in the fall of 1971.

How System Works

When a dye order is set up, for example, cards containing all relevant information, are produced and entered into the system at the plant which will process the order.

All other information for packing line paperwork is input via the data entry units by pressing thumb-tack switches. For example, after filling each microphonophone, the operator at the wrapping table enters the date and first case number. He also dials in the dye order number each time he begins wrapping rolls from a new dye order as well as the tare weight of the carton and tubes any time there is a change.

But for each roll he wraps the operator dials-in only the piece number and number of yards. The two data entry units at each table are piggy-backed—the piece number and yards are entered at the top unit; less frequent entries are input via the bottom one.

The operator then moves down the conveyor line to another operator at the scale. He dials in the number of rolls placed in the carton and the scale weight, then pushes a button.

The printer beside him produces the six-part shipping paper required with the shipper's name, which may be the name of a customer or "pack and hold," the case and order, color, dye order and piece numbers, style, width, color number and description, linear yards, fold, quality, number of pieces, number of rolls, tube weight, carton weight, gross and net weight, and shipping instructions.

The numbers of pieces, yards, and weight are produced from packing line entries and/or from computer calculations. The rest of the data is retrieved from disk memory storage.

The operator then dials in the last copy, the case label, from the set, weighs the packed side, affixes the label to the case, and forwards the remaining copies in the set for distribution.

Meanwhile, in the packing office, the printers there produce the bulk-mailing and sales invoices, again based on a combination of stored data and information dialed-in from the packing area.

At the main plant, invoicing cards are produced for processing by the central computer. And cards are produced to update inventory records.

In addition, both shifts and vacation replacements, we have three or four operators who have used each of the units and they all grasped their operation quickly. This is because, perhaps, so much of the data and all of the calculations involved are provided by the computer.

With the level of computer assistance, we feel we could increase our packing capacity 50% at the main plant merely by adding one additional table and two operators. We also may install electric scales, feeding directly into the 1800.

We believe that the present applications require less than one-fourth of the capacity of the process control computers. This is fortunate because they will play a key role in our developing plans for an on-line, data base system.

All related data will be supplied through the computers, which will be linked to a larger central computer. It will, in turn, be designed to provide pertinent management information at various levels via CRT terminals.

Guilford Mills is building a 170,000-square-foot warehouse adjacent to the main plant and plans to install data collection equipment there.

Next, we plan to expand the system throughout the manufacturing areas such as the laminating plant, print plant, and all sections of dyeing and finishing operations.

Finally, we will tie in the company's retail and sample areas in New Jersey. Thus, we hope to ultimately coordinate all operations on-line—from on-order raw materials through final sales and sales analysis.

While the total system is perhaps three years in the future, we have already initiated knitting machine monitoring via the 1800 computers. We are starting with 80 machines at one plant, with another 28 just being installed, and 26 others a little further along.

Improved personnel scheduling will be tied-in to scheduling of yarn from a computer-based yarn inventory system. We anticipate that the net result will be substantial upgrading in overall efficiency.

McGarr is vice president/inventory and treasurer for Guilford Mills.

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This supplement is must reading for computer users and must advertising for software marketers.

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CI Notes

GE Plans Mark III Service

BETHESDA, Md. — GE plans to introduce its new Mark III time-sharing service later this summer along with a new high-speed remote terminal.

The concentrator, called the Datasat 1500 and jointly developed by Information Service Division and the Data Communication Products Department, is a high-speed unit which will support all IBM bisynchronous communications as well as ASCII.

The new Mark III service will allow users to perform remote batch work and time sharing. The system differs from some others, because separate computers will handle the different work, although it will appear as a single system doing foreground/background processing, according to GE.

Mohawk Pressing Tape Action

HERKIMER, N.Y. — Mohawk Data Systems Corp. has announced the first deliveries of its newly acquired tape drive line in the very near future.

The drives, acquired as part of the deal which brought Bucode Inc. to Mohawk, are fully compatible with the IBM 3420 unit as well as a large line of OEM equipment, which will also be marketed by Mohawk.

Telx Terminal Expected

MINNEAPOLIS — Telx will soon announce a point-of-sale terminal system. Based on a minicomputer, the first system will be installed at a chain of specialty stores in the Southwest and will be built by the Minneapolis division of the firm.

Univac to Announce Controller

PHILADELPHIA — Univac will shortly introduce the UTC terminal controller soon. The device will allow Unisys CRTs to be interfaced with IBM 360s and 370s and will make the Unisys CRT look like an IBM 2260 to the IBM CPUs.

Supershorts

Computer Machinery Corp. has announced the shipment of its 100th and 101st CMC 5 Keyprocessing systems to Helment Cards, Hartford, Conn. CMC is in its fifth month of deliveries of the CMC 5.

GRI Computer Corp. has announced a national service agreement with the Services Division, Electrical Group, Reliance Electric Co.

Conrac Corp. has received from Computer Machinery Corp. an order for 1,000 CRT units for use in the display portion of data entry terminals.

On-Line Systems, Inc. has signed a licensing agreement with Applied Data Research, Inc. to market the Mimic small-computer program development system.

Argonaut International, Inc. has announced a complete service for firms seeking to market or expand its marketing efforts abroad. The firm will serve as a central information processing and end office equipment suppliers in their export efforts.

Computer Terminal Corp. has shipped over 425 Datapoint 2200 computer/terminal systems since going into volume production with the unit in the latter half of 1971.

IBM to Drop Extended 30 Maintenance Abroad

By E. Drake Lundell Jr.
of the CW Staff

NEW YORK — IBM World Trade Corp. will not maintain 360/30 CPUs that have been extended beyond the U.S. and Canada, according to a statement through the parent company will maintain those systems in the U.S. on a best-efforts basis as the result of the stipulated judgment in the Itel/AMS suit against IBM.

More directly affected will be Computer Investors Group which has several European orders for Datasat recall memories which they market.

The official IBM position on the market is that "IBM World Trade will offer contract arrangements to cover a majority of maintenance needs for use by IBM customers who have an order prior to May 1, 1972, and installed on or before July 1, 1972, 2030 model CPUs which have been entered in order to increase their memory capacity to 128K words." After the dates for order and delivery mentioned in the statement, IBM will not offer maintenance of any type — not even on a best-efforts basis — to overseas customers.

The move only affects users who

want to expand the memories of their Model 30 CPUs and does not affect users of other machines in the 360 line. IBM has approved continued maintenance on most of the extended systems for use by 300 companies on a worldwide basis.

Computer Investors Group, which has been actively marketing in Europe, has protested the move to IBM officially, according to Roger Gottz, vice-president for marketing.

"But we don't know what our next move will be," he added, noting that the independents would have to take IBM to court in every country where they do business if they wanted to keep the maintenance such as the one obtained in the U.S. as a result of the Itel/AMS litigation.

Because of that lag, all of the manufacturers said they expected a surge in sales over the next year to 18 months, although the European and worldwide markets had not been very lucrative in the past.

"But who knows what will happen to that market now that IBM has made this move," one said, echoing the sentiments of all.

"It seems strange," another of the

extended memory makers said, "that IBM would make a move like this to deny the European users of the advantages of extended memory. The main advantage is availability to the U.S. user with IBM maintenance on a best-efforts contract."

"The problem is especially critical," another pointed out, "since there are almost no independent maintenance firms with a strong organization in Europe. If the distributor that he really wants the extended memory, he will have no place to turn to get maintenance," he added.

"It is surprising," another said, "that IBM is able to maintain those systems in Europe. Many companies ordered before July 1, but is not able to maintain those ordered or delivered after those dates. It seems to me to be a contradiction."

"I think IBM is trying to cut the independents' share of the overall extended memory market before it even gets started," another manufacturer said.

"There aren't many units there now, and with this move it looks like there won't be many more in the future," he added.

Peripherals 'Hot'

Exhibitors Pleased—They Find Sales

By a CW Staff Writer

ATLANTIC CITY — Even with a declining number of booths and exhibiting companies, the spring show was rated a moderate success by many exhibiting firms.

At the same time, however, many of the exhibitors on the floor — and apparently many non-exhibiting firms — felt the semiannual show should be done away with in favor of one national show with more regional adjuncts (see story on Page 38).

With the number of exhibitors down to 144 from 195 last spring, the rate of technological development and product innovation dropped considerably from last year's show.

The introduction of Domain Tip Technology in a product form drew heavy crowds to the Cambridge Memories booth, according to Dick Egan, marketing vice-president, who said the firm was seeing some good customer contacts with the possibility of several sales from the show.

But while interest was high in this new memory technique, there were almost no representatives at the show for semiconductor memories, and traditional OEM companies seemed to be demonstrating their end-user products and putting little emphasis on the traditional core business. The hottest OEM area of the floor was

devoted to peripherals for minicomputers, although most of the large mini companies were absent, with the exception of Data General.

"While it doesn't seem to be seeing as many people as we have at other shows," one of the mini peripheral people said, "we have been seeing some good contacts and making enough sales to make the show pay off."

"This is the type of show we will be seeing more often in the future," a tape drive manufacturer said, "with little emphasis on new products and more emphasis on improving present units that are already in use."

"I also think," he commented, "that the orientation of the show will still be with heavily OEM, even though Aips seems to be making most of its efforts in expanding the end-user base of the conferences."

The introduction of the JCC's 9000 Series tape transport.

ICW Photo by E.D. Lundell Jr.

David Krueger (on crutches), marketing manager of Kennedy Co., points out a feature of the firm's 9000 Series tape transport.

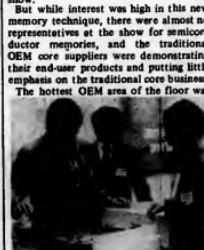
The earliest possible date for changing to the one-show format would be in Philadelphia next spring, but most informed sources are betting it will begin in 1974 with the spring show in Chicago.

In order to boost attendance at the next show (in Anaheim, Calif.), this fall Aips will convene a group of user-oriented adjunct meetings along with its regular conference activities.

But at the same time Aips is trying to integrate vertical market shows into the JCC format, several of the exhibitors on the floor were calling for a more industry-oriented show, almost eliminating trade show managers and the OEM business side of the industry.

Even with the changes in the scheduling of the shows under active consideration, there is still the possibility that the JCCs will stay in their present form, due to the relative success of this year's conference.

As one exhibitor said: "This is a lot better than I expected. The people are good and I'm making sales, so why might not work."



JAMES WEILS of Casius shows the Model 303 disk drive to W.D. Melville of Eastman Kodak.



Avery Blake, vice-president at Iomega, demonstrates the Iomega Series 1 disk drive.

The big news of the show to exhibitors was that the Aips board of directors was actively considering moving to one national show a year as recommended by the Industry Advisory Panel, a group of present and potential JCC exhibitors.

Aips President Keith Uncapher said the idea was under "active" consideration as one of the options open to future conferences, and Wally Anderson, Aips president-elect, noted the top priority for Aips was improving the quality of the shows for the entire computer commun-

Tape Drives, Cassette Recorder Brighten Firms' SJCC Displays

ATLANTIC CITY -- Several firms used the Spring Joint Computer Conference here last week as a showplace to introduce new tape drives.

Per Data and Kennedy Co. found the show to be a forum for the announcement of new large tape units, while Sycon was active in displaying its Model 125 Syco recorder, a digital cassette recorder presently used in its intelligent terminal system.

The new Kennedy 2000 drive, designed for the Olivetti 1000 series, operates at up to 150 in./sec. The 7- or 9-track unit can operate at either 800 bit/in. or 1,600 bit/in., the firm said.

The unit sells for \$3,125 in single quantities and as low as \$2,500 in quantities of 100.

The firm also introduced the 8075 buffer tape unit, capable of operation at from 25 in./sec to 90 in./sec, the firm added.

The 7- or 9-track unit uses a vacuum transistor to search at speeds of up to 150 in./sec.

The 8075 sells for \$5,400 in single quantities and \$4,600 in larger quantities. Per Data's Series 1000 transports include the D-600-1 at 25 in./sec; the D-600-2 at 37.5 in./sec; the D-600-3 at 45

SJCC OEM Products

in./sec; and the D-600-4 at 75 in./sec.

All of the units in the family cost \$3,995 in single quantities for the 800 bit/in. model and \$4,895 for the 1,600 bit/in. version.

The 8075 buffer unit features IBM-compatible head guide geometry and bidirectional operation, the firm said.

Start time is 5 msec at 75 in./sec as is

Bell & Howell's Mark-Tape System

stop time, with start and stop time being inversely proportional to the speed for the other models in the line, the firm added.

The Model 125 Syco recorder from Syco works and reads at 12.5 in./sec providing a data rate of 10,000 bit/sec at 800 bits/in. packing density, Sycon said.

The unit features 20/25 msec start/stop times and can be purchased as a stand-alone unit, or as part of various combinations of read/write, motion control or logic electronics, the firm said.

The maximum capacity is 300,000 characters, the firm said.

Celus Memories Disk Drives Come in 24, 48 Mbit Versions

Celus Memories, Inc.'s booth featured its new front-loading Model 203 micro-



International Teletypewriter's Telexer 30

mini disk drive and the Model 103 fixed disk drive. Ninety percent of the new drive components is common with the top loading Model 303 already on the market.

The 203 provides 24 Mbit of storage on a single removable disk, or 48 Mbit with the addition of a second fixed disk.

The 203 interfaces with all common minicomputers and may be rack, console or desk mounted. Celus said it utilizes the same controller as the top loading Model 303 and the Model 103, a sealed, fixed disk drive that sells for \$1,800.

The 103's fixed disk and voice coil operated moving head are permanently sealed in a dust-free environment.

International Teletypewriter Shows 30 char./sec Printer

A new 30 char./sec teleprinter was unveiled by International Teletypewriter Corp., Christia, N.J.

The Telexer 30 uses an impact matrix print head and delivers to five copies.

The font and character set of the printer are determined by read-only memory IC chips in the electronics.

In 500-quantity, prices are \$600 for the print mechanism and \$1,600 for a fully interfaced K58 terminal.

Deliveries will begin this summer.

Bell & Howell Displays Mark-Tape

Bell & Howell demonstrated its new Mark-Tape system, designed as a fast and efficient way to capture source data on computer-printable magnetic tape, according to the firm.

The Mark-Tape system reads punched, keypunched, preprinted and computer-imprinted data (or any combination of the four) entered on standard or elongated cards, or on page-size documents, the firm said.

Marked data is optically read, translated and written on a standard 8-1/2-in. reel, computer grade 1/2-in. tape in either 7- or 9-track configurations.

Digitronics Has Tape Reader

Digitronics Corp., Southboro, Mass., showed a new asynchronous perforated tape reader, Model 2015, and tape reader, Model 6015.

The tape reader handles punch line operation, bidirectional read modes, at asynchronous speeds to 150 char./sec and reads 5- to 8-level tape.

An optional tape handler, Model 6015, with 4-in., 5-1/4-in., 6-in. diameter reels, is also supplied.

The 2015 combines a photoelectric read station with a bidirectional tape drive system.

Houston Ins. Introduces Interface

Houston Instrument, Bellair, Texas, introduced a plotter interface for positive bus PDP-8 series computers which relieves the software of computing the best incremental straight line between two points and reduces the number of I/O commands to the plotter interface, the company said.

The interface is intended for use only in operational environments where computer time for driving a plotter is at a premium and should not be utilized instead of the standard DEC plotter interface if computational time is not critical, Houston said.

Ntronics Has 1/4-in. Digital Heads

Ntronics Co., Inc. exhibited its line of 1/4-in. digital heads in read-write and read-after-write format. Typical models, designated DQ-1100 (read/write) and DQ-1101 (read-after-write), are available with 1 track for serial mode recording; others have 2, 3 or 4 independent tracks.

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'No Shortage of Need'

Take It From Learson... 'Worst Is Over'

By Edward J. Bride
Or the CW Staff

ATLANTIC CITY — Computer industry leaders here through "the recession," but "things are looking up," according to IBM Chairman T. Vincent Learson.

Recalling the rapid rate of financial setbacks, Learson said the cutbacks were also "healthy" because they forced industry and users to "face up to what was essential and what was not" in DP installations.

"The worst of that period is behind us," he told some 1,500 attendees at the keynote session of last week's Spring Joint Computer Conference.

"Things are looking up," he related, "and we hope that you are getting through to you." Business, in general, is "well on the way to recovery."

While managers still view computers as "indispensable" tools, he continued, "the ground rules have changed, and changed most sensibly."

Users today are demanding a guaranteed "good return on their investment," he said, and they are insisting that they be able to see that return over a sensible period of time.

With the technological advances of the next few years, "added new applications on current and oncoming systems" will

But Overcapacity May Slow Computer Growth, Lynn Feels

ATLANTIC CITY — The growth rate in the computer industry is going to taper off, especially in the area of scientific applications, M. Stuart Lynn of Rice University told the SJCC here last week.

"It is probable that the current overcapacity of computers will force industry to underwrite new applications to support continued expansion," Lynn said.

"Moreover, it is likely that the most acceptable applications will be those whose economic payoff is readily justifiable by the cost of tape, in spite of past management experience and of the current economic climate," he added.

Unbundling of the major computer suppliers, Lynn noted, "has pushed applications research and development more than ever to the end-user. Although this may be good news on traditional users, it limits important uses of computers among new users."

In the future, the emphasis of the industry will be "on making known applications work in a more meaningful environment," Lynn added, emphasizing there will be a shift away from the scientific environment to other emerging application areas.

Mag Disk Technology To Dominate Decade

ATLANTIC CITY — Magnetic disk memories not only will remain the dominant form of on-line storage over the next decade, but will achieve dramatic improvements in capacity and cost.

This prediction for the computer industry was presented at SJCC by IBM's John M. Harker, manager of future systems storage at the company's Systems Development Division Laboratory.

Given the momentum of the technology, Harker believes it will continue to run ahead of emerging alternatives at least through the 70s.

With the aid of new materials and methods, Harker estimates there is a potential to improve linear density by a factor of 5 to 10, and track density by a factor of 2 to 4.

Beyond that, he points out, the cell sizes will be limited by intrinsic noise, and the cost of further improvement could outweigh gains.

help computer usage "measure up very nicely to the historic growth rate of the past."

"For there is no shortage of need," he added.

Learson called the recessionary period a "depression" during his opening speech, although he preferred not to differentiate between that and the more often-used term "recession."

The IBM chairman expressed concern over possible government regulation of the computer industry, particularly with regard to consumer billing systems or ordering systems, noting "there is already legislation pending . . . to protect consumers against the automation that produces some unsettling results" as ruined credit reputations, frayed nerves and incorrect deliveries.

While the consumer must be protected, the industry itself must do the protecting, he indicated.

"Restrain and restriction," he stated, "can only lead to a stifling of innovation with bureaucratic rules and restrictions that could not only add to our costs — but seriously impair the freedom and flexibility we must all have" to keep computer technology moving.

The "tradition" of the computer industry, he said, was that it went ahead and did what it "seemed ought to be done," when issues arose.

The computer industry has "met the first test" of any new industry, he said, "to perform."

"And that performance," he said, "has kept for us the public acceptance we enjoy in the freedom to move this industry along as fast as creativity will take it."

The task facing the industry now, he continued, is that of "proving that this technology can be integrated constructively into the life of the nation."



(CW Photo by V.J. Farmer)
"Things are looking up" — Learson



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President

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System Design Roles Debated

University, Industry... a Union?

By E. Drake Lundell Jr.
Of the CW Staff

ATLANTIC CITY — The question of how much cooperation there should be between the universities and industry in the design of computer systems was debated thoroughly here last week with proponents for both more and less cooperation having a say.

At an SJCC session on "The Role and Scope of Computer Systems Design and Research in a University Environment," Prof. James A. Glimskas, Associate of UCLA, called for greatly increased cooperation between the two.

Cooperation Required

"We need a coexistence between industry and the universities to design and put together innovative computer systems," he said.

Universities should be involved in joint projects to design systems, with participation from employees of business, students and faculty, he added.

The university projects, he stated, should be "state-of-the-art" products, machines made with state-of-the-art components, so that they can be turned over to the industry for commercial use quickly upon the completion of the design project.

To take full advantage of research in the university environment, he said, was that it not be motivated solely by monetary considerations, but rather that the industry would be more willing to take innovative risks than those in industry design projects.

The actual design and construction of large-scale computer systems was good experience, he added, for students in the computer sciences and would enable them to contribute more to the industry on completion of their studies.

The pitfalls to research on large-scale systems in the university environment, he added, have been a lack of familiarity with the manufacturing process which makes up a major part of the construction of these systems. With cooperative projects this could be overcome by bringing in industry people with expertise in this area.

Often, he added, many universities in the past have hired too many professionals to complete large-scale projects and therefore didn't give enough training to their students.

However, while advocating large-scale projects cooperatively between the university and the industry, Aviannis noted that one of the major projects in this area — the project between Burroughs and the University of Illinois for the development of the Illiac IV — was a disaster, a view that was generally shared by most of the panel.

There was a definite need, however, he noted, for cooperation so that the innovative ideas of the universities could find their way to the marketplace and so that innovation would continue to mark computer design work instead of being hampered by commercial constraints.

Edward J. McCluskey, professor of computer science and director of the Digital Systems Lab at Stanford University, disagreed with his fellow panelists on the idea of symbiosis between the universities and industry.

He also disagreed that building large systems was necessary in order to train computer architects, indicating that work on smaller systems might provide just as good training.

But while opposing the idea of cooperation on large research, design and construction projects, McCluskey said he believed in interactive programs with industry, by which computer students with a basic theoretical knowledge of the art would spend some time working in industrial organizations to gain experience in large systems design and construction.

He said this internship would have to come at an "appropriate time in the student's career" before he got his PhD, or it would cause after that his ideas would be too set in their ways."

Even better than sending students to industry for hands-on experience, he said, would be a reverse internship program where industry personnel would spend some time in the university environment upgrading their theoretical skills, he added.

He said he believed that students should work on small projects as opposed to the building of large super computers, because they did not have to spend so much of their time worrying about construction details and could therefore get a quicker grasp of the necessary concepts.

"Mainframes are not the end-all of computer and digital sys-

tems design," he pointed out, noting there were excellent opportunities for innovation in peripheral equipment, small dedicated mainframes and non-computer-related digital systems.

Mike Flynn, professor of computer science at Johns Hopkins, took a middle ground, disliking even further the idea of cooperation between industry and the university.

Flynn said the universities must take their place in the theoretical aspects of computer systems design and science and let them gain their experience in the actual building of large systems when they enter industry.

"At present, the universities feel that at times in the past they have had an almost unreasonable fear of attempting large design projects, and partly this fear has been justified, but it can be overcome."

When undertaking a large systems project, the biggest part of the job is not the theoretical design, but management of the different divergent tasks that must be performed to actually produce the system.

The universities are not equipped with the requisite management skills needed to manage such mammoth projects, he indicated.

"Corporations have enough difficulty fulfilling commitments to build large-scale systems," he noted, adding that he could not think of any large-scale project that had been completed in the allotted time frame.

The universities should not waste the student's time, he felt, in the actual details of construction of the systems, because their task was to teach the theory behind the systems, not fabrication.

An intermediate proposal was outlined by Professor C. Gordon Bell of Carnegie-Mellon University, who recently received a grant to undertake research involving some industry cooperation.

He said that Digital Equipment Corp. became involved in the project by helping to fabricate the first computer modules designed by students and faculty at the university.

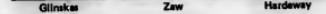
After the modules had been built, he said, students could use various modules to actually build their own simple computer systems by wiring them together, allowing the students to design systems designed to meet certain specifications and to be geared to certain applications and functions.



Kudisch



Peterson



Glinskas



Zaw



Hardaway

CW Photographer Asks: How Many Shows Needed?

By Molly Upton

Of the CW Staff

ATLANTIC CITY — "There is a need for a computer industry show, but one a year would be sufficient."

This was the general consensus of several SJCC exhibitors here when questioned by *Computerworld*. While most of the attendees from the East and West coasts, as the semiannual joints do, often preferred alternating these with a midwestern location in the third year,

the concern of years ago now proved well founded, and six months was a long time to wait before showing something. But the industry has reached a plateau. And users are no longer going to buy something because it's new," observed Tony Glimskas, marketing graphics manager of Electronic Associates Inc. "They are asking what the product is going to do for them."

But since EA's products, such as a huge plotter and a hybrid computer with remote terminals, are not designed for any particular industry, Glimskas feels that a computer industry show is the best way to expose EA's products.

The Fall Joint was considered the better of the two shows by both Glimskas and Bob Peterson, terminal and program manager of Tektronix, who also favored one show.

"The Fall Joint seems to be more hardware-oriented," he said.

Len Zaw, exhibit manager for Teletype Corp., said he thought

location would be a key consideration in determining the number of shows. About 70% of attendees at shows are from outside, but one a year would be sufficient, he noted. While not pleased at the attendance trend at SJCC, he said he would have to wait and review the results from this show.

Ron Hardaway, advertising supervisor of AT&T's prefers one show a year, and suggested a site in the middle of the country. AT&T shows in about 65 to 80 shows a year, but Hardaway cited the success of the computer industry show that draws users from a spectrum of industries.

James McEwan, eastern area sales manager of Texas Instruments, said one show a year would be "great," and managed to convince skeptical Richard Jenkins, TI's manager of computer equipment marketing, that the concept is feasible.

Jenkins was concerned that one show wouldn't draw as many people as two, but admitted that if the industry stays static, the two shows will be revenue losers in two shows is a significant factor.

Kevin Nowlan, western regional manager of Decision Data, said he favored one show a year, "so long as it's on the West Coast."

R. Kudisch, eastern regional manager for ICI Milgo, advocated two shows a year. "You can't do justice to an overall picture," he said. "We see a large number of prospective users at the joints," he added.

Uncapher Challenges Industry to Help Government

By CW Staff Writer

ATLANTIC CITY — The computer industry must act now to help "set national goals and priorities" to assure the effective utilization of computer techniques to further our understanding of its nature and purpose.

Keith Uncapher, outgoing AFIPS president, challenged the computer industry with those words last week in a "State of the Union" speech.

In addition, Uncapher said that the industry should help the government "provide the incentives necessary to stimulate a major and ongoing research and development program" in the field of computer techniques.

To further this goal, he called for the establishment of a "central office in Washington, D.C., to provide a focal point for the computer field, to work with Congress to establish a single voice, a single focal point to get where we want to go — and what we have to do to get there."

The office, which could be established by AFIPS and another group, would be responsible for the following:

- Initiation of a series of studies leading to the establishment of a commission on the computer industry.
- The commission would have as its prime purpose an in-depth study of all aspects of our field including those of

an economic, technological and professional nature.

- The undertaking of specific studies on topics such as government practices, regulatory procedures and R&D incentive programs.

- The establishment of a common meeting place for the computer field within Washington with the facilities for conferences and seminars, including briefings for members of Congress and their staffs on issues of national importance.

- The setting up a central clearinghouse for experts in all areas related to the employment of computer technology in the national interest.

- The investigation of possible new legislation which may be needed to insure the continued application of our technology in the public interest and in keeping with national goals.

- The continuing investigation of critical areas of our technology, important aspects of which are the promotion on permission for concrete incentives for essential R&D programs."

- "What we need to concentrate on now," Uncapher said, "is our responsibility to make our systems perform in keeping with the real needs of the citizenry, and to improve the problem-solving capability of the user in keeping with his own needs."

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Independent Memory Makers Weathered Maintenance Storm

By E. Drake Lundell Jr.

Of the CW Staff

ATLANTIC CITY — The replacement market extended memory to mainframes in the IBM maintenance threats of last winter and will jump dramatically this year, marketing managers for major firms in the field agreed here last week.

At the same time, many of those who have helped the industry, because of the visibility given to extended memory in the fight over who would maintain the mainframes.

With this year behind them, the group is now looking generally at the IBM 370 marketplace, with most of the marketing managers here believing it was mandatory for a firm in the business

for the long haul to have 370 capability.

"It is hard to tell how many customers have switched to the IBM moves," according to Roger Goetz, vice-president for marketing at Computer Investors Group, which markets the Data Recall units.

"At the beginning of the year we were shipping 3 to 4 units a week and then dropped to 2 to 3 units a month right after the IBM announcement. Although the 360/30 memory replacement market has picked up," Goetz said, "we have yet to see the enthusiasm in the market pick up to the level prior to the IBM moves."

But at the same time, overall business for the firm has been up

significantly so far this year, with replacement and add-on sales to the 360/40 and 360/50 units holding well while the 360/30 sales were dropping, he added.

While "it's hard to say" how much the IBM moves affected Fabritext's business, Ken Geason, president of the firm, estimated that the order rate for 30 equipment dropped around 40% right after the IBM moves.

The maintenance moves not only affected the sales of 30s with memory beyond the IBM limit, but also affected the replacement sales in the 30 marketplace, Geason said.

Users, he said, adopted a wait and see attitude toward replacement and extended memories, and in the case of the IBM moves, he said, adoption of a wait-and-see attitude lasted for around four months.

"During that time sales were on a plateau, and we haven't really reached the old sales curve on the 30s. We're still lagging a little," he said.

Geason said, "The reasons growth hasn't picked up to its old level,

Gesson said, is that users are adopting a wait and see attitude toward the IBM promise of "best efforts" maintenance on 360/30s extended beyond 64K.

"We user," he said, "usually wants to get stuck if this best efforts maintenance doesn't work out. They want to see how it is working before they make the move."

At the same time, Geason was quick to point out that his



CW Photo by E.O. Lundell

Gesson and Goetz talk over the extended core memory market and the rough winter in the 360/30 marketplace after IBM threatened to withdraw maintenance.

knowledge "IBM has indeed supplied true best efforts" to users of extended 360/30s.

Most users have had very few problems with maintenance since the issue was resolved, he said, noting that the IBM attitude is to go to every cooperative today, especially when compared with last winter.

"The care tactics are over," he said, adding, "It's too bad that they weren't more cooperative before so we could resolve the maintenance issue without getting users scared away from the independent firms."

Dick Egan, vice-president of marketing at Cambridge Memories, agreed the IBM moves hurt 30 businesses, but added that lately there has been a rash of big orders for 30, 40 and 50 memories.

The IBM moves caused a "temporary freeze" in the business, according to a spokesman for Ampex, which did not show up at the conference here last week, but came to see what the com-

petition was up to.

"The move caused a number of our potential customers to interrupt their plans, but the market seems to have come back strongly since the issue was resolved," he said.

All the marketing managers agreed that their firms had to be in the 370 marketplace because users were demanding that suppliers of 360 memory be capable of upgrading to 370s when the user decided to upgrade to a 370.

Geason said that Fabritext would be introducing its 370 memory line this year with shipments for 370/155s and 165s.

Ampex did not show up during the show that it had made the first shipment to the 370 market with an installation up and running at Outboard Marine in Chicago.

Gesson from Computer Investors said they planned to make their first 370 shipment later this month.



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Old-Timers Asked To Give Up Data

WASHINGTON, D.C. — Early hardware and software designers are being asked to contribute their thoughts to the computer history project at the Smithsonian Institution here.

Co-sponsored by the institution and the American Federation of Information Processing Societies (Afps), the project was first opened in 1967, as a part of the Smithsonian's Museum of History and Technology.

William Carlson, chairman of the project's advisory committee at Afips, said the committee is "constantly amazed" at the amount of unpublished material being volunteered" by individuals who participated in the "early stages" of computer development.

"We need to gather enough momentum to begin catching up on the 1935-1955 period while the pioneers of that era are still alive," he concluded.

The committee is also seeking financial assistance, about \$75,000 per year during the next five years, Carlson said. The collection includes working papers, manuals, unpublished reports, drawings, photographs and related materials covering major developments in computer technology.

Interviews are also taped and included as part of the project, and about 80 individuals currently are recorded in 400 hours of these interviews, Afips said. A brochure on the project is available from Afips headquarters, 210 Summit Ave., Montvale, NJ 07645.

PUBLIC SALE OF COLLATERAL June 1, 1972

The Western Pennsylvania National Bank (WPNB) of Pittsburgh, Pennsylvania, having a security interest in a computer system, program, master file and documentation called "SCHOLARSHIP SEARCH," being used by the Pittsburgh Public Schools, located at 1000 Penn Avenue, New York, N.Y. 10017, has declared the obligation of EGS to be in default and has appointed Edward M. Hammer Esq., 160 Franklin Street, New York, N.Y. 10013, as receiver to collect all amounts due to sell said systems and related material at public sale. WPNB reserves the right to extend the date of sale.

Mr. Kreimer has set Thursday, June 1, 1972 at 2:00 P.M. at his office at a time and place of sale. Terms will be cash or Pittsburgh funds. The amount of collateral is \$125,000.00. For more information call: Douglas Raymond of WPNB, (412) 462-6100.

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U.S. Productivity Seen Dependent on DP Exports

By E. Drake Lundell Jr.

Or we can't.

ATLANTIC CITY — The computer industry represents one of the nation's "best hopes" for increasing productivity and aiding the national balance-of-payments problem, according to Martin van Gessel, acting director of the Commerce Department's Bureau of International Commerce.

The industry, he said, "is one of our country's best hopes for increasing exports. Properly applied information technology increases our productivity and makes our goods more competitive overseas."

"In addition," he continued, "American computer technology is more advanced than any other in the world. When you look in the international marketplace, your statistics prove the point — U.S. exports of computers and parts rose from \$295 million in 1966 to well over \$1 billion in 1971."

World Trade Day?

Van Gessel's remarks came at the first "World Trade Day" sponsored by Afips in conjunction with the Spring Joint Computer Conference in an effort to boost interest in participation in the semiannual show and to better serve the needs of exhibitors and other industry firms.

In order to improve the balance-of-payments problem which has affected the U.S. economy, van Gessel said, the administration had established a long-term export goal of \$125 billion by 1980, up almost four times from the \$44 million registered in 1971.

"To put this goal in a more immediate time frame," he said, "it would be wise to export \$60 million in 1974."

In order to improve trade, van Gessel said, the U.S. must "have better and new plants so we can improve productivity... win the fight against domestic inflation... have fair treatment in overseas markets."

In addition, he called on industry to specifically the computer industry to make a strong commitment to international trade and marketing.

In an area of great interest to the computer industry, van Gessel said: "We are also very much involved in addressing ourselves to the dilemma or our antitrust policy as it relates to the special situation of the exporter."

"Some of our businesses feel that a law designed in 1890 to control domestic trusts makes it difficult for them to compete overseas," he asserted. Therefore, in a review of the antitrust areas as it affects our international activities."

Multinational Companies

He also said that the administration was beginning to pay more attention to the role of multinational companies in the U.S. trading picture, and all the major computer manufacturers are clearly in this class.

"I guess," he claimed, "the big do-it-all multinational companies not only have contributed to our own economic base in terms of profit and jobs — but are a vital vehicle

for transferring our technology and skills to developing countries, and eventually bringing to the U.S. unique foreign technology as well as increasing amounts of raw materials."

"Multinationals," he continued, "are obviously making a significant contribution to our world trade position."

The U.S. Government, he said, must "take even more vigorous steps to provide our international businessmen with the same degree of services and support as our competitor countries."



(CW Photo by E.D. Lundell)
Non-U.S. exhibitors at SJCC were few this year. Fuji memory was one of the two or three entrants from Japan.

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3 Software Houses Improve Earnings, Revenues

Things seem a bit brighter in the software industry with three software houses, Applied Logic Data Research, Informatics Inc., and Comshare, Inc., reporting improved earnings and revenues for various periods ended in March.

Applied Logic Research reported record operating results for the year ended March 31, and a profit for the period.

Revenues reached \$2.1 million, compared with \$1.6 million in the year-ago period, and earnings were \$13,590 or 1 cent a share compared with a loss of 10 cents a share for the same period in 1971.

Informatics' earnings for the year ended March 25 increased by 58%. Earnings were \$424,000 or 28 cents a share compared with \$268,000 or 18 cents a share the previous year.

Revenues also rose, to \$17.5

million from \$16.5 million in fiscal 1971.

Figures include losses from discontinued operations of \$120,000 and \$159,000 respectively for 1972 and 1971, but excluded revenues from these operations.

Product sales for the year were up 40%, from \$4.6 million to \$6.5 million, and accounted for 37% of Informatics' revenues, according to President Walter F. Bauer.

Revenues from Mark IV, the first file management system, for the second consecutive year rose 30% over the previous year. Custom services dropped to \$11.1 million from \$19 million in 1971, which Bauer attributed to "the general sluggishness of the market and a soft government market."

"All things considered, this was

one of the best years in the 10-year history of the company," Bauer noted.

Comshare's balance sheet for the first quarter ended March 31 showed earnings of \$146,800, 2 cents a share compared with a loss of \$72,900 or 1 cent a share in the same 1971 quarter.

Revenues rose to \$1.7 million from a restated \$1.1 million in the year-ago period. The 1971 figures were restated to reflect a deferral of income from the Scott prod. into the 1972 period due to the effect to the equity method of accounting for income in unconsolidated affili-

ates.

The 1972 quarter revenues include \$113,400 of the deferred Scott revenues.

Increased revenues resulted from increased sales of the Dynaprobe and Amigos product lines, according to President Fred C. Ihner.

Service Bureaus, T/S Firms Look Better

Several service bureaus and time-sharing outfits are reporting improved performances.

Applied Logic Corp. cut its six-month loss to \$31,000 or 19 cents a share from \$12,000 or 8 cents a share in the same 1971 period ended March 31. Revenues increased by \$5,000, to \$1.2 million.

Assets Restated

As part of the firm's "aspects of growth," a retained deficit as of Oct. 1, 1971, of \$10.3 million has been charged off against additional paid-in capital, and assets and liabilities restated at fair values.

A recapitalization agreement of April 1971 provided for a reduction of the total debt and rental obligations from \$10.9 million to \$6.8 million. These two steps "made a fresh start possible with the beginning of the current fiscal year," according to President Martin T. Mohach.

Applied Logic also increased its ownership of affiliate Mathematics Park, Inc. from 49.9% to 82.4%.

The company now has 28% fewer employees than it did in

March 1971, noted Mohach.

Applied Logic "has emerged from its struggle for survival during the past two years and is now gradually and prudently advancing toward profitable margins in its future operations."

Tower Computing Corp.'s revenues for the quarter ended March 31 rose 28.7% to \$2.2 million from \$1.7 million in the first quarter of 1971.

Helped by a \$47,000 tax loss carryforward, earnings soared to \$111,000 or 2 cents a share, from \$20,000 in the 1971 period.

TCC's three regional centers had their best profit performance in the company's history, according to President Warren A. Watson.

Rapidair Inc.'s first quarter revenues increased by 40%, to \$1.1 million from \$1.2 million, and earnings rose to \$188,359 or 21 cents a share, from a \$143,374 or 17 cents a share in the 1971 period.

The 1971 figures included a tax loss credit of \$62,320 or 7 cents a share, so operating income more than doubled during the period.

A substantial growth in operating income for the year at Computer Dimensions, Inc. was wiped out by writing off discontinued operations of an associated company of the firm.

Revenues rose to \$8.8 million from \$5.8 million in 1970, and income from operations climbed to \$138,826 or 9 cents a share, compared with \$8,874 or 1 cent a share in the prior year.

But写off the discontinued operations resulted in a loss of \$174,677 or 11 cents a share compared with earnings of \$50,874 or 4 cents a share in 1970.

At Computer Servicenters, Inc., earnings during the six months ended Feb. 28 rose 109%, to \$45,366, or 6 cents a share, compared with \$21,694 or 3 cents a share for the same period a year ago.

The increase was achieved despite a 20% reduction in service revenues, which were \$1.1 million compared with \$1.3 million a year ago.

The Birmingham, Ala., service bureau managed to cut the cost of its service by 37%, according to President Kenneth G. Robinson II.

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But he doesn't make mistakes. He delivers your computers intact and on time. He's got a reputation and a job... and he wants to keep both.

He's part of Atlas. He listens and learns... to serve you better.



For special attention, call collect to Wayne Kuhlman (312) 424-7611



Computerworld Stock Trading Summary

COMPUTERWORLD

All quotations
quoted, computed and
formulated by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

CLOSING PRICES THURSDAY, MAY 18, 1972

	1972						1973						PRICE					
E	CLOSE	OPEN	WEEK	WEEK	X	RANGE	CLOSE	OPEN	WEEK	WEEK	X	RANGE	CLOSE	OPEN	WEEK	WEEK	X	
S	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	
SOFTWARE & EOP SERVICES																		
O ADVANCED COMP TECH	1-	2	1 1/8	-	+ 1/8	-9.0	N MASHUA CORP	88-	56	54	+ 2	+ 5.8						
O APPLIED DATA RES.	5-	7	4 1/2	-	+ 1/2	-2.7	N REYNOLDS & REYNOLD	37-	20	19	1/4	+ 1/4	1.5					
O DATA COMM	1-	2	1 1/2	-	+ 1/2	-1.1	N STANDARD REGISTER	14-	20	19	1/4	+ 1/4	1.5					
O AUTOMATIC DATA PROC	72-	91	82 3/4	-	+ 3 1/4	+5.8	N TAS PRODUCTS CO	14-	20	19	1/4	+ 1/4	1.0					
O AUTO SCIENCES	1-	1	1 1/2	-	+ 1/2	-0.8	N UNISYS CORP	23-	26	25	1/2	+ 1/2	-7.7					
O AUTOMATION DIVISIONS	1-	1	1 1/2	-	+ 1/2	-0.8	N UNIVAC BUS SYSTEMS	23-	26	25	1/2	+ 1/2	-10.4					
O COMPUTER NETWORK	6-	7	4 5/8	-	+ 5/8	+8.8	N WALLACE BUS SYSTEMS	23-	26	25	1/2	+ 1/2	-0.5					
N COMPUTER SCIENCES	8-	10	8	-	+ 1/4	+3.2	N BURROUGHS CORP	147-	176	175	+ 7 1/2	+ 4.2						
O COMPUTER TECHNOLOGY	6-	8	7	0	0	0.0	N COLLINS IND	34-	41	37	3/4	+ 1/2	+ 2.8					
O COMPUTER USAGE	9-	14	17 1/2	-	+ 1/2	+11.1	N COMPTON CORP	55-	67	66	1 1/2	+ 1/2	+ 1.6					
O COMPUTER REPORTS	1-	1	1 1/2	-	+ 1/2	+1.1	N DATA GENERAL CORP	56-	99	62	1 1/2	+ 1/2	+ 7.7					
O COMPUTING & SOFTWARE	20-	28	21 1/2	-	+ 1/2	+1.0	N DIGITAL COMPUTER	12-	25	13	1 1/2	+ 1/2	+ 10.4					
O CONSHARE	5-	10	5 1/2	-	+ 1/2	+0.8	N ELECTRONIC ASSOC.	6-	15	10	1 1/2	+ 1/2	+ 2.4					
O DATA AUTOMATION	1-	1	1 1/2	-	+ 1/2	-0.8	N ELECTRONIC ENGINEER.	8-	16	9	1 1/4	+ 1/2	-1.3					
O DATAMATION SERVICE	1-	1	5/8	0	0	0.0	N FOXBORO AUTOMATION	34-	41	37	3/4	+ 1/2	-1.5					
O DATASTAR	9-	8	6 1/2	-	+ 1/2	+1.8	N HARRIS MAGNETICS	14-	20	19	1/4	+ 1/4	+ 1.0					
O DATAWARE RESOURCES	1-	1	1 1/2	-	+ 1/2	+0.8	N HONEYWELL INC	130-	158	147	1 1/2	+ 1/2	+ 1.2					
O ELECTRIC COMP PROG	3-	5	2 3/4	-	+ 1/2	+4.5	N INSTRUMENTATION	15-	24	22	1 1/2	+ 1/2	+ 0.5					
O ELECTRONIC DATA SYS.	45-	65	56 1/2	-	+ 1/2	+3.0	N INTERDATA INC.	8-	16	10	7/8	0	0.0					
O INFORMATICS	11-	13	12 1/2	-	+ 1/2	+0.8	N KODAK CORP	121-	146	140	5/8	+ 1/2	+ 2.3					
O I.O.D. DATA CORP	1-	2	2	-	+ 1/2	+11.1	N MANDI LABS.	35-	59	57	3/4	+ 1/2	+ 7.9					
O KEANE ASSOCIATES	1-	7	1 1/2	-	+ 1/2	+4.1	N MICRODATA CORP	5-	10	8	1 1/2	+ 1/2	+ 6.4					
O KEYTEK CORP	7-	11	10 1/2	-	+ 1/2	+0.8	N MITSUBISHI CORP	29-	36	32	+ 2	+ 1/2	+ 6.6					
O LICO INC	1-	9	7 1/2	-	+ 1/2	+18.8	N NCR	58-	61	57	1 1/2	+ 1/2	+ 0.3					
O MANAGEMENT DATA	6-	10	8 1/2	-	+ 1/2	+13.7	N RAYBURN RAND	35-	39	37	3/4	+ 1/2	+ 3.9					
O NATIONAL CCS INC	8-	15	15 1/4	-	+ 1/2	+14.9	N SAMSUNG	11-	16	13	3 1/4	+ 1/2	+ 6.1					
O NAT COMP ANALYSTS	1-	1	7/8	-	+ 1/8	+16.6	N SONY	15-	24	22	3 1/2	+ 1/2	+ 0.5					
O NATIONAL COMPUTER INC	1-	2	2 1/2	-	+ 1/2	+11.1	N TANDY CORP	120-	146	140	5/8	+ 1/2	+ 2.3					
O PLANNING RESEARCH	12-	17	12 1/2	-	+ 1/2	+7.6	N TRACOR	120-	146	140	5/8	+ 1/2	+ 2.3					
O PROGRAMMING METHODS	1-	22	22 1/2	-	+ 1/2	+5.7	N UNISYS CORP	120-	146	140	5/8	+ 1/2	+ 2.3					
O SCIENTIFIC COMPUTERS	1-	2	2 1/2	-	+ 1/2	+4.3	N VICTOR COMPUTHODEM	15-	24	22	3 1/2	+ 1/2	+ 0.8					
O SIMPLICITY COMPUTER	1-	5	4	-	+ 1/2	+5.8	N XEROX CORP	121-	146	140	5/8	+ 1/2	+ 2.3					
O SOFTWARE SYSTEMS	1-	3	3 1/2	-	+ 1/2	0.0	N YOUNG	120-	146	140	5/8	+ 1/2	+ 2.3					
O STACOR COMPUTER	1-	2	2 1/2	-	+ 1/2	+0.8	N ZEPHYR COMPUTER	120-	146	140	5/8	+ 1/2	+ 2.3					
O TRACOR COMPUTING	2-	3	3 1/2	-	+ 1/2	+6.6	N ZEPHYR SYSTEMS GRP	120-	146	140	5/8	+ 1/2	+ 2.2					
O TWSHARE INC	7-	10	7 1/2	-	+ 1/2	+3.5	N ZEPHYR SYSTEMS INC	120-	146	140	5/8	+ 1/2	+ 2.2					
O UNIVERSITY CENTER	1-	2	2 1/2	-	+ 1/2	+0.8	N ZEPHYR SYSTEMS INC	120-	146	140	5/8	+ 1/2	+ 2.2					
O UNIVERSITY COMPUTING	19-	20	23 3/4	-	+ 1/2	+9.8	N ZEPHYR SYSTEMS INC	120-	146	140	5/8	+ 1/2	+ 2.2					
O URS SYSTEMS	6-	10	9 5/8	-	+ 1/2	+8.4	N ZEPHYR SYSTEMS INC	120-	146	140	5/8	+ 1/2	+ 2.2					
O VORTEX CORP	4-	5	2 1/2	0	0	0.0	N ZEPHYR SYSTEMS INC	120-	146	140	5/8	+ 1/2	+ 2.2					
PERIPHERALS & SUBSYSTEMS																		
N ADDRESSOGRAPH-MULT	34-	42	38 7/8	-	+ 2 1/2	+7.6	N BROTHER COMPUTER	8-	15	9	3 1/2	+ 1/2	+ 8.0					
N ALPHAMERIC	1-	2	1 1/2	-	+ 1/2	+0.8	N BREWSTER CORP	1-	8	9	3 1/2	+ 1/2	+ 0.0					
N ANPEX CORP	8-	15	8	-	+ 1/2	+10.0	N COMDISCO INC	1-	8	9	3 1/2	+ 1/2	+ 20.0					
N ANPEX-JACOBSON	1-	10	10 1/2	-	+ 1/2	+6.3	N COMPUTER EXCHANGE	2-	15	12	3 1/2	+ 1/2	+ 22.2					
N ATLANTIC TECHNOLOGY	3-	11	8 1/2	-	+ 1/2	+23.0	N DCC INC	15-	24	22	3 1/2	+ 1/2	+ 1.0					
N BOLT, BERKELEY & NEW	5-	18	16 1/2	-	+ 1/2	+7.6	N DODGE	8-	11	7	3 1/2	+ 1/2	+ 5.2					
N BUNKER-RAMSEY	9-	18	18 1/2	-	+ 1/2	0.0	N DOW JONES	11-	17	12	3 1/2	+ 1/2	+ 6.0					
N CALCOMP	10-	13	10 1/2	-	+ 1/2	+2.5	N EATON COMPUTER	12-	19	16	2 1/2	+ 1/2	+ 1.2					
N CEDAR POINTS DATA CORP	11-	13	12 1/2	-	+ 1/2	+23.1	N ELEASCO CORP	19-	26	20	1 1/2	+ 1/2	+ 0.0					
N CEDRONICS	3-	5	2 3/4	-	+ 1/2	+0.8	N ELETOR CORP	7-	4	2 3/8	0	0.0	0.0					
N COMPUTER CORP	5-	7	5 1/2	-	+ 1/2	+10.7	N FEDERAL COMPUTER	11-	16	13	1 1/2	+ 1/2	+ 1.5					
N COMPUTER EQUIPMENT	3-	5	3 1/2	-	+ 1/2	+10.7	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N COMPUTER MACHINERY	7-	13	10 1/2	-	+ 1/2	+9.7	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N COMPUTER SYSTEMS	2-	5	3 1/2	-	+ 1/2	+0.8	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N FABRI-TEX	2-	5	3 1/2	-	+ 1/2	+1.3	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N GENERAL COMPUTER SYS	1-	1	3 1/2	-	+ 1/2	+2.1	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N HAZELTINE CORP	59-	70	68 1/2	-	+ 1/2	+1.0	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N INFINIX	9-	13	10 1/2	-	+ 1/2	+12.8	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N INFORMATION DISPLAYS	3-	5	2 3/4	-	+ 1/2	+4.7	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N MANAGEMENT ASSIST	1-	2	3 1/2	-	+ 1/2	+13.2	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N MEMOREX	27-	38	33 1/8	-	+ 1/8	+ 0.3	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N MILDELECTRONICS	17-	21	20 1/2	-	+ 1/2	+18.1	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N OPTICAL SCANNING	7-	16	10 1/2	-	+ 1/2	+1.6	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N PERTEC CORP	11-	17	15 1/2	-	+ 1/2	+8.6	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N QINETIX	12-	17	15 1/2	-	+ 1/2	+12.8	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N QINETIX	12-	17	15 1/2	-	+ 1/2	+12.8	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N PRECISION INST.	2-	13	11 1/2	-	+ 1/2	+2.2	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N RECOGNITION EQUIP.	10-	15	9 1/2	-	+ 1/2	+1.2	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N SANDBERG ASSOCIATES	16-	21	18 1/2	-	+ 1/2	+1.7	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N SANDBERG ASSOCIATES	9-	13	10 3/8	-	+ 1/2	+1.2	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N SANDBERG ASSOCIATES	10-	15	10 3/8	-	+ 1/2	+1.2	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N STORAGE TECHNOLOGY	17-	36	36 1/8	-	+ 1/8	+6.7	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N TALLY CORP.	1-	13	9	-	+ 1/2	+15.8	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N TECNOMIX INC	38-	50	50 1/4	-	+ 1/4	+10.4	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N TELEX	10-	15	10 1/2	-	+ 1/2	+2.5	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N TELEMECH	128-	151	150 1/2	-	+ 1/2	+ 0.0	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					
N TELEMECH	42-	49	49 1/2	-	+ 1/2	+ 0.0	N FEDERAL COMPUTER	12-	19	16	1 1/2	+ 1/2	+ 1.5					

SUPPLIES & ACCESSORIES

O BALTIMORE BUS FORMS	6-	9	7 1/2	0	0.0
O BARRY WRIGHT	9-	13	11 1/2	+ 1/2	+ 6.0
O DATA DOCUMENTS	17-	26	22 1/2	-	-3.2
O DOW JONES	12-	17	15 1/2	-	+ 0.0
O DUPONT BUS FORMS INC	12-	17	15 1/2	-	+ 1.5
O DUPONT BUS FORMS INC	7-	9	8 3/8	-	+ 1.5
O OHARAH MAGNETICS	15-	27	20 3/8	-</	

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*For complete information,
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